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ABSTRACT

This curriculum guide provides technology learning activities designed to prepare students in grades 6-10 to work in the world of the future. The 8-day course provides exploratory, hands-on learning activities and information that can enhance the education of students of all types in an integrated curriculum that provides practical applications of academic skills. The guide contains both instructor and student sections. The instructor's section includes the following: background information; expected learner outcomes; suggested activities; suggested resources; instructional sequence; equipment, tools, and supplies worksheet; pretest and posttest with answers; and an evaluation summary. The student's section contains these components: an introduction; summary of activities; pretest and posttest instructions; assignments; goal; glossary; expected learner outcomes; objectives; related Technology Student Association events; academic and workplace applications; impact statements; career information; and an optional activity that could be used for solving problems or reinforcing learning. This guide contains activities for learning thermal screen printing by designing and screen printing a tee shirt. (KC)

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ED 380 604

Technology Learning Activity

Technology Education Series

THERMAL SCREEN PRINTING

TLA TE-1119

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CE068304

CIMC

Teacher Edition

Oklahoma Department of
Vocational and Technical Education
1500 West Seventh Avenue
Stillwater, OK 74074-4364

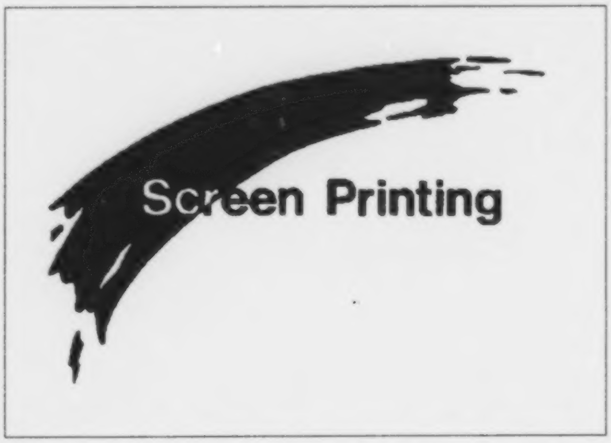
TECHNOLOGY EDUCATION

TECHNOLOGY LEARNING ACTIVITY

TE1119

THERMAL SCREEN PRINTING

Suggested Time: 8 Days



Developed by the
Curriculum and Instructional Materials Center
for the Technology Education Division
Oklahoma Department of Vocational and Technical Education

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Cover photo courtesy NASA

TABLE OF CONTENTS

FOREWORD 4
PREFACE 5
ACKNOWLEDGEMENTS 6

TECHNOLOGY EDUCATION OVERVIEW
- About the Program 8
- About the TLAs 10
- About Ordering TLAs 12
- Corrections and Suggestions 14

USING THIS PUBLICATION: INSTRUCTOR'S SECTION
- Background Information 15
- Expected Learner Outcomes 15
- Suggested Activities 17
- Suggested Resources 18
- Instructional Sequence 18
- Equipment, Tools, and Supplies Summary Worksheet 18
- Pretest and Posttest 19
- Test Answers 19
- Evaluation Summary 19

USING THIS PUBLICATION: STUDENT'S SECTION
- Introduction 20
- Summary of Activities for the Day 20
- Pretest Instructions 21
- Assignments to Turn In 21
- Goal 21
- Words You Should Know 21
- Expected Learner Outcomes 22
- Objectives 22
- Related TSA Competitive Events 22
- Academic and Workplace Applications 23
- Impact Statements 29
- Career Search 30
- Posttest Instructions 30
- Skunk Works 31

HAZARD ALERT MESSAGES 32

INSTRUCTOR'S SECTION 35

STUDENT'S SECTION

FOREWORD

What will be the careers of the future? The workforce of tomorrow will be shaped by the technologies being developed today. Students today need accurate, interesting information on growing technologies in order to make informed decisions about their futures.

It is our hope that this curriculum will help improve the quality of career decisions for our students. Students are introduced to a wide range of current, "cutting-edge" technologies and are encouraged to think critically about how those technologies influence their lives and futures. Today's students do not have to become the victims of "technological illiteracy," but instead can learn to anticipate technological developments and take positive steps to prepare for the future.

Technology Learning Activities provide students with the knowledge and an introduction to the skills they need for a positive learning and career experience. Every generation is faced with learning how to manage technological advances. Information gained through participation in the *Technology Education* program can help students develop a holistic view of technology on which to base their educational and career decisions.

Roy Peters, Jr., Ed.D., State Director
Oklahoma Department of
Vocational and Technical Education

Lynn Hawkins, State Supervisor
Technology Education
Oklahoma Department of
Vocational and Technical Education

PREFACE

We believe that one of the most effective ways to improve education is through the development and implementation of a sound instructional materials system. Technology Education instructional materials represent a new design for CIMC which recognizes the importance of graphic materials in the learning process.

Technology Education instructional materials are designed for 6th through 10th grade students. The design of these materials is based on current research on how people read and gain information from documents. The design is called "New Look" and integrates both graphics and text into a balanced presentation which is easy to use and follow.

Technology Education provides the student a look at what the world will be like in the future based on technologies in use and being developed today. Throughout the Technology Education instructional materials, the students are introduced to "cutting-edge" technologies that they will use and encounter in a working environment later in life. This exposure gives them a wide range of experiences on which to base career decisions.

This publication is intended as a starting point, from which the teacher can innovate, localize, and personalize in order to prepare students for their future. The *Technology Education* series of Technology Learning Activities was written with the realization that we are creating the workforce of tomorrow by how and what we teach about technology today.

Sherry Wietelman, Curriculum Development Specialist
Curriculum and Instructional Materials Center
Oklahoma Department of
Vocational and Technical Education

ACKNOWLEDGEMENTS

The Curriculum and Instructional Materials Center (CIMC) extends its appreciation to those individuals who played important roles in the development of Technology Learning Activity materials.

Generous thanks are extended to Lynn Hawkins and Jim Harder, both Technology Education teachers at Mayfield Junior High School, for the time, talent and knowledge they contributed in determining the content of this Technology Learning Activity (TLA).

We also thank the State Director, Dr. Roy Peters, Jr., and the Assistant State Director, Dr. Charles O. Hopkins, for their continued support throughout this project.

The school administrator, Joe Shirley, who supported instructor participation in this project and allowed his facility to be used as a field test site deserves a special thank you, as well.

Oklahoma Department of Vocational and Technical Education Technology Education staff who provided leadership and direction on this project also deserve special recognition.

Lynn Hawkins
State Supervisor
Technology Education

Donovan Bowers
Assistant State Supervisor
Technology Education

Harold Holley
Assistant State Supervisor
Technology Education

Thank you is also extended to Charles F. Kemnitz, Atlatl Communications, Inc.

Only through the close cooperation of the Curriculum and Instructional Materials Center staff was this curriculum developed. Sincere thanks are shared with the CIMC coordinators.

John Friedemann
CIMC Coordinator

Lynna Ausburn, Ph.D.
CIMC Development Coordinator

Special recognition and thanks are also extended to other individuals within the Oklahoma Department of Vocational and Technical Education (ODVTE) involved in the development and distribution process: Noel Wilcoxson, Duane "Frosty" Foster, and Diane Ensign and their staffs at the

ODVTE Print Shop; Bob Davis and staff artist Kathryn Moore for the cover design; Darrel Stiles and his staff in the ODVTE Warehouse for packaging and coordinating transportation and distribution of these materials; and Rose Primeaux and her staff in Word Processing.

Finally, a big thank you to all ODVTE team members who offer their support on a daily basis in "behind-the-scenes" ways but never seem to be recognized for their contributions: Suzanne Perry and Terri Tomson, CIMC secretaries; Karen Heppel and Shirley Hill, Technology Education secretaries.

Sherry Wietelman
Curriculum Development Specialist
Curriculum and Instructional Materials Center
Oklahoma Department of Vocational and Technical Education

TECHNOLOGY EDUCATION OVERVIEW

About the Program

Because the American culture is distinctly characterized as technological, it becomes the function of our schools to give every student an insight into and an understanding of the technological nature of the culture. Technology Education strives to perform this function.

Technology Education in Oklahoma is an instructional program that provides young men and women (grades 6 - 10) with daily, hands-on exploratory experiences and insights into technology and career opportunities so that they can make meaningful occupational and educational choices. It is a program which can enhance the educational experience of all students, whether they are the valedictorian/honor-type student, the middle range/average student, or the student who has found little success in school, namely the at-risk student.

Technology Education acquaints all students with their technological environment so they can make rational decisions about their own lives on a day-to-day basis and participate in controlling their own destiny. The program directs students to related technological and industrial fields, enabling students to realize their full potential and make maximum use of their individual talents in fulfilling career goals in their selected areas of employment.

Technology education capitalizes on the individual's potential for reasoning and problem solving, for imagining and creating, and for constructing and expressing through the use of tools and materials related to technology. It develops content and

TECHNOLOGY EDUCATION OVERVIEW

experiences to contribute to the growth and development of students commensurate with their potential. Thus, Technology Education is a basic and fundamental study for all persons in regard to career explorations and educational opportunities.

Opportunities to develop and apply leadership, social, civic, and technologically related skills are provided through the Technology Student Association (TSA). TSA is the appropriate vocational student organization identified as a teaching tool for teachers to use in assisting students to achieve identified course competencies. Competency-based activities are an integral part of the instructional program.

All Technology Education courses are taught in a one-period block of-time (45-55 minutes), with each of the four Technology systems (communication, construction, manufacturing, and transportation, energy and power) being designed to provide a means through which other courses such as math, science, English, and social studies can be applied in a practical manner within a technology-based situation. Teaching across the curriculum is vital to the success of a Technology Education program.

TECHNOLOGY EDUCATION OVERVIEW

About the TLAs

The *Technology Education* series consists of 40 Technology Learning Activities (TLAs) for instruction and a supplemental activities book. Each TLA is divided into two parts: an instructor's guide and a student guide. The instructor's guide provides an overview of Technology Education, a summary of activities and supplies needed for students to complete the Technology Learning Activity, a supplies and materials worksheet for the instructor, an overview of the particular TLA, written exam answer sheets, and evaluation summary for the TLA.

Master copies of the evaluation summary sheets, pretest and posttest, and supplies and materials worksheets are provided with this instructor's edition of the TLA. These sheets may be reproduced for classroom use.

All of the TLAs focus on measurable and observable learning outcomes. Instructors are encouraged to supplement, personalize, localize, and motivate with these materials in order to develop a complete teaching/learning process.

TLAs are designed for use in more than one class period of instruction. Careful study of each TLA by the instructor will help her or him determine the following:

- Skills to demonstrate
- Supplies and equipment needed

TECHNOLOGY EDUCATION OVERVIEW

- Amount of time needed for student practice
- Workstation Bookshelf, Instructor's Reference Materials, and a bibliography are provided for supplemental resources
- Supplementary materials, including print and non-print media to order
- Resource people to contact
- Facility modifications which may be necessary to administer the TLA

Each TLA is based on performance objectives. Performance objectives are specific, stating the performances necessary to meet the goal of the TLA.

The overall goal of the unit tells what the student should be able to do and what standard will be used to determine whether the student has achieved competency. The specific objectives outline the sequence of the competencies required to meet the TLA goal. The competencies may be either cognitive, requiring knowledge only, or psychomotor, requiring knowledge and skill.

TECHNOLOGY EDUCATION OVERVIEW

About Ordering TLAs

Additional TLAs in the *Technology Education* series may be ordered through the Oklahoma State Department of Vocational and Technical Education, Curriculum and Instructional Materials Center, 1500 West Seventh Avenue, Stillwater, OK 74074-4364. Phone 1-800-522-5810.

NOTE: The 1100- and 1200-series numbers given on the next page are for ordering TLA Instructor's Editions; to order Student Editions, change the first two numbers to 31 (for 8-Day TLAs) or 32 (for 6-Week TLAs).

TECHNOLOGY EDUCATION OVERVIEW

TLA Title	Order No.
8-DAY TLAs	
Aerospace and Flight	TE1117
Agricultural Education	TE1123
Audiovisual Programming	TE1131
CAD — Autocad Release 10	TE1114
Career Search	TE1104
Drafting	TE1134
Electricity — Principles and Applications	TE1105
Electronic Publishing	TE1135
Electronics (CES)	TE1106
Fluidics Technology	TE1116
Health Occupations	TE1124
Home Economics	TE1125
Introduction to VoTech	TE1122
Introduction to Animation	TE1132
Keyboarding and Computer Application	TE1115
Laser/Fiber Optics/Holography	TE1129
Lasers Technology	TE1103
Marketing Education	TE1126
Material Processes — Plastics	TE1133
NASA Aerospace-Spacelink	TE1111
Photography	TE1130
Problem Solving	TE1110
Research and Design	TE1101
Residential Construction	TE1121
Robotics — Control Technology	TE1112
Robotics — ProArm	TE1113
Safety Design Briefs	TE1107
Structural Engineering	TE1102
Synergetic Technology	TE1120
Technical Report Writing	TE1118
Technology Challenge	TE1109
Thermal Screen Printing	TE1119
Trade and Industrial Education	TE1127
TSA Leadership	TE1108
Vocational Business	TE1128
6-WEEK TLAs	
Animator	TE1203
CAD/Board Drafting	TE1201
Control Technology	TE1202
Electronics/Electricity/Robotics	TE1204
Electronic Publisher	TE1205

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TECHNOLOGY EDUCATION OVERVIEW

Corrections and Suggestions

CIMC wants to provide Technology Education instructors and students materials that are accurate and effective. Although the CIMC strives to maintain the highest standards of development and production, oversights occasionally do occur. If you find any errors in this or other CIMC publications or have suggestions for improving their usefulness, please notify the CIMC staff. One easy way of pointing out errors is to make a photocopy of the affected page and indicate the correction on the copy. Mail this information to the CIMC, where it will be used to correct the publication before the materials are reprinted.

To ensure that the material is updated on a timely basis, notify the CIMC of necessary corrections as soon as possible. Do not assume that someone else will notice the error and inform the CIMC; other users may be making the same assumption. Please send corrections and recommendations for improving this publication to the following address:

Curriculum Development Coordinator
Curriculum and Instructional Materials Center
Oklahoma Department of Vocational and
Technical Education
1500 West Seventh Avenue
Stillwater, Oklahoma 74074-4364

USING THIS PUBLICATION

INSTRUCTOR'S SECTION

Background Information

The background information component provides instructors with basic information about the subject of the TLA. Instructors are encouraged to use suggested resources for additional information on the specific technology used in each TLA.

Expected Learner Outcomes

There are 19 Expected Learner Outcomes for the *Technology Education* series. Not every TLA fulfills all 19 Expected Learner Outcomes, so outcomes specific to each TLA are listed in the Instructor's Section and in the Student's Section. The 19 Expected Learner Outcomes for the *Technology Education* series are:

- The student will know and appreciate the importance of technology and technological literacy.
- The student will explore career opportunities so they can make meaningful occupational choices.
- The student will explore future educational opportunities so they can make meaningful educational choices.
- The student will apply problem solving and critical thinking techniques.
- The student will apply math, science, reading, and other school subjects in a practical situation.
- The student will develop keyboarding and computer literacy skills.

USING THIS PUBLICATION

INSTRUCTOR'S SECTION

- The student will develop basic skills in the safe and proper use of tools, machines, materials, processes, and technical concepts.
- The student will recognize and develop individual talents.
- The student will think logically and sequentially.
- The student will develop leadership, creative abilities, positive self-concepts, and individual potential in a technological society.
- The student will become a more sophisticated consumer of the goods and services of a technological society.
- The student will adjust to a changing technological environment.
- The student will develop an understanding and the ability to adapt to those technological forces that influence life in the 21st Century.
- The student will develop an understanding of economic development.
- The student will communicate by making clear and relevant points through the development of mental process skills.

USING THIS PUBLICATION

INSTRUCTOR'S SECTION

- The student will apply design, imagination, and creative abilities.
- The student will learn applications of lifelong learning skills.
- The student will think globally and act locally.
- The student will explore the organization and management systems of business and industry.

Suggested Activities

The suggested activities component is to assist during the preparation stage of the teaching/learning process. The activities provide suggestions for preparation and evaluation during the instructional process. The instructor should read the suggested activities before assigning the TLAs to allow time to obtain supplemental materials, prepare audiovisual materials, and contact outside resource persons. Duties of the instructor will vary according to the particular TLA.

USING THIS PUBLICATION

INSTRUCTOR'S SECTION

Suggested Resources

Suggested resources include people and print and non-print media that may be used with the TLA. References used during the development of each TLA are also provided. The instructor can use suggested resources and TLA references to supplement her or his knowledge of the subject to help students with particular interests or objectives in the area covered. Please note that suggested resources and references listed in this publication existed when this publication was written. CIMC assumes no responsibility for providing these materials and cannot ensure the availability of these materials as individual vendors, manufacturers, and publishers may discontinue these products at any time.

Instructional Sequence

This component provides instructors with daily lesson plans for the TLA. Included in the instructional sequence component are suggested daily assignments and equipment, tools, and supplies that will be needed for each student. A column for facility requirements or modifications is provided for each instructor. This component is provided as a guide to plan for and monitor students' progress through the TLA.

Equipment, Tools, and Supplies: Summary Worksheet

This component is provided as a planning tool for instructors. It provides instructors with a list of the necessary equipment, tools and supplies to support student activities and provides specific information for budgeting purposes.

USING THIS PUBLICATION	INSTRUCTOR'S SECTION
Pretest and Posttest	These components provide criterion-referenced evaluation of the objectives listed in each TLA. If objectives or activities have been added, deleted, or modified, appropriate changes should be made on the tests.
Test Answers	This component is provided to assist instructors in evaluating student performance on written tests.
Evaluation Summary	This component is provided to assist instructors in summarizing the performance of each student on an individual basis. The evaluation summary forms are also provided as photocopy masters for the instructor's use.

USING THIS PUBLICATION

STUDENT'S SECTION

Introduction

Daily activities are the step-by-step procedures students will follow to complete the learning experience. Each TLA is organized by daily tasks and activities. Students are able to pace their progress through the TLA by referring to the activities for the day.

Within the daily activity pages are components common to all TLAs.

Summary of Activities

A Summary of Activities page begins each day of the TLA. This page provides several important pieces of information for both the student and instructor.

❶ In the left column, this page provides the student with a list of activities to be accomplished that day.

❷ In the right column, the major Academic and Workplace Application which applies to that day's activities is graphically indicated with a standard icon.

❸ Below the icon is a list of specific skills reinforced during that day's activities.

USING THIS PUBLICATION

STUDENT'S SECTION

Pretest Instructions	The students are required to take a Pretest as one of the first day's activities. The instructions for the Pretest are given in this section.
Assignments to Turn In	Day One includes a list of all assignments the students are expected to turn in during or at completion of the TLA. This list includes all tests, activities, and products covered in the TLA.
Goal	On Day One, following the assignments checklist, is a concise statement of the overall goal of the TLA. This statement summarizes the purpose for completing the TLA and encourages the student to think about the broader implications of the learning experience.
Words You Should Know	The first day's activities includes a glossary of unfamiliar technical terms used in the TLA. Often these terms are necessary for the student in order to accurately follow instructions in the activity procedures. The students should be encouraged to review this glossary and refer to it often during the course of the TLA.

USING THIS PUBLICATION	STUDENT'S SECTION
Expected Learner Outcomes Reinforced by this TLA	As stated in the guide to the Instructor's Section, there are 19 identified Expected Learner Outcomes associated with the *Technology Education* series. This section of Day One activities lists the Expected Learner Outcomes that specifically apply to the TLA. A student who reviews this list will gain a better understanding of the scope of experiences and skills to be gained from the TLA.
Objectives	Each TLA is made up of a set of measurable objectives. In this section on Day One, students are given a list of all the objectives addressed in the TLA. This list can serve to introduce students to the "flow" of the TLA as they build introductory skills in a technology.
Related TSA Competitive Event(s)	Each TLA may be used by students to begin work toward completion of a Technology Student Association competitive event. Some TLAs are tied to a specific TSA event; other TLAs may be used with several events. This Day One section gives the student and instructor a list of appropriate TSA events which the TLA may support. TSA competitive events promote leadership development and an understanding that winning isn't everything, but involvement is. Events are staged at Local, Regional, State, and National levels through which the student may progress.

USING THIS PUBLICATION

STUDENT'S SECTION

Academic and Workplace Applications

The curricular content and activities found in this Technology Learning Activity help students apply academic and workplace competencies. These competencies include: Reading Skills, Writing Skills, Mathematics Skills, Science Skills, Oral Communications Skills, Interpersonal or Relating Skills, Creative Thinking and Problem Solving Skills, Employability Skills, and Social Studies Skills.

Preparing students to enter successfully into today's world ...

Preparing students to enter successfully into today's world of work offers vocational education a substantial challenge. The contemporary workplace is characterized by constant and rapid technological change and by increasing job complexity and skill intensity. Due to rapid technological advancement, the half-life of work skills is now reduced to a bare three to five years. Out of this new workplace environment has arisen a growing national awareness of the critical importance of an American workforce armed with the skills necessary to survive in a competitive economy.

... emergence of a renewed emphasis on basic academic skills ...

One result of this national awareness has been the emergence of a renewed emphasis on basic academic skills in all areas of education. Pressure to increase academic skill development is being placed on education by both legislative action and industry mandate. The Carl D. Perkins Vocational and Applied Technology Education Act of 1990 sets stringent academic and workplace skill requirements for vocational education. State legislatures are increasingly requiring basic skills accountability by teachers and school administrators.

STUDENT'S SECTION

... expected learner outcomes are being implemented with increasing frequency.

Graduation exams, minimum competency requirements, and expected learner outcomes are being implemented with increasing frequency. In addition, business and industry are delivering the message clearly to educators that vocational competence now requires increased strength in academic and workplace skills.

The issue of basic skills ... was successfully addressed in a national three-year study ...

The issue of the basic skills currently required in the workplace was very successfully addressed in a national three-year study conducted jointly by the American Society of Training and Development (ASTD) and the U.S. Department of Labor (DOL). The findings of this study were published in 1990 in the book, *Workplace Basics: The Essential Skills Employers Want.*

... research indicates clearly that American employers ... need a variety of skills ...

The ASTD/DOL research indicates clearly that American employers have discovered that their workforces need a variety of skills that include, but are not limited to, the classic academic trio of reading, writing, and computation. Employers now are also looking for competence in areas such as "learning to learn," problem solving and critical thinking, interpersonal and teamwork skills, oral communication and listening techniques, and the social and personal management skills that demonstrate a capacity for independence and responsibility in on-the-job performance.

USING THIS PUBLICATION

STUDENT'S SECTION

... business and industry have expanded and re-defined "workplace basics."

It is clear that the requirements of today's business and industry have expanded and re-defined "workplace basics." It is in line with this re-definition, and with the competency requirements of current education legislation, that the Oklahoma Department of Vocational and Technical Education has chosen to address "basic skills" in the instructional materials produced by its Curriculum and Instructional Materials Center.

CIMC materials contain information and activities which develop academic and workplace application competencies ...

It is not a new development for CIMC materials to contain information and activities which develop academic and workplace application competencies in students undertaking vocational programs. What is new is the specific marking, or flagging, of items in our instructional materials that address academic and workplace application skills.

To assist teachers and students in identifying activities which promote academic and workplace skills ...

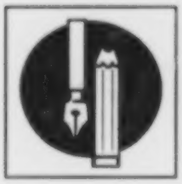
To assist teachers and students in identifying activities which promote academic and workplace skills development, CIMC has implemented a marking system which uses simple graphic symbols, or icons. These icons are located in the right margins of Activity Sheets. The following is an explanation of the icons and the kinds of academic and workplace application activities they indicate.

USING THIS PUBLICATION

STUDENT'S SECTION

READING SKILLS: Skills involving use of print resource material for obtaining and applying information.

Current vocational education literature indicates that functional literacy as a workplace basic needs to be defined in terms of reading competencies actually required for job performance. The activities identified with this icon as addressing reading skills in CIMC materials deal specifically with developing reading skills in an applied, job-related context. These range from general information-gathering activities to tasks requiring use of specific technical reference materials. Many contain a "learning to learn" aspect, which promotes engaging actively and purposefully in vocationally relevant enquiry.



WRITING SKILLS: Skills involving written communication of processes, information, or ideas.

Tasks identified with this icon promote development of skills in written communications. As with reading skills, the writing skills emphasized in CIMC materials have a vocational context. They include filling out forms, keeping work activity records, writing simple memos and letters, generating more complex reports and articles, and written expression of ideas and concepts related to vocational performance or exploration.

MATHEMATICS SKILLS: Skills involving computation, calculation, and interpretation of numerical data.

This icon identifies activities which develop vocationally-related skills in computation, measurement and estimation, selection and application of appropriate mathematical processes, and collecting, displaying, or interpreting data.

USING THIS PUBLICATION

STUDENT'S SECTION

SCIENCE SKILLS: Skills involving mastery and application of scientific information or theory.

This icon marks activities which are related to the development of skills in either the physical or biological sciences. These skills stress occupationally-related applications of science and technology.

ORAL COMMUN-ICATION SKILLS: Skills involving speaking and listening.

Activities marked with this icon promote development of effective speaking and listening. They include practice in such areas as speaking techniques, word choice, non-verbal messages, use of communication media, and using active listening techniques. Many of these activities promote "learning to learn" skills in verbal enquiry.

INTER-PERSONAL OR RELATING SKILLS: Skills involving working and getting along with others.

Activities which deal directly with skills in relating to others are marked with this icon. This includes areas such as multi-cultural awareness, group processes and dynamics, negotiation, dealing with conflict, cooperation and teamwork, values and attitudes, and leadership and motivation.

USING THIS PUBLICATION

STUDENT'S SECTION

CREATIVE THINKING AND PROBLEM SOLVING SKILLS: Skills involving comprehending, applying, analyzing, and developing complex ideas and situations.

This icon identifies activities which stress development of higher-order thought processes such as problem identification and analysis, lateral thinking, evaluating alternatives, developing solutions, examining assumptions, and evaluating outcomes.

EMPLOY-ABILITY SKILLS: Skills involving choosing, obtaining, and succeeding in a career.

Activities marked with this icon relate to competencies required to obtain employment and develop a career. These competencies include specific occupational tasks. They also include items such as career analysis and selection, job searching, completing applications and resumes, interviewing, and business etiquette and personal management skills required for job-keeping and maturing in one's work. Examples of the latter category include personal presentation, self-discipline, work accuracy, reliability, discretion, punctuality, stress handling, judgement, confidence, etc.

SOCIAL STUDIES SKILLS: Skills involving investigation and application of social concepts.

This icon marks activities which stress competencies in fields relating to human society and its distribution and relationships. This includes areas such as history, geography, government and politics, economics, psychology, sociology, demographics, current events, cross-cultural studies, consumer issues, environmental issues, and ethical concerns in science and technology.

USING THIS PUBLICATION

Impact Statements

STUDENT'S SECTION

There are five areas of human culture for which each TLA has an impact. These impact statements appear during Day Eight, after the student has gained some familiarity with the technology.

❶ *ENVIRONMENTAL IMPACT:* A statement introducing the student to the impact of the technology on the environment.

❷ *SOCIAL/CULTURAL IMPACT:* A statement concerning the impact of the technology on society and culture.

❸ *ECONOMIC IMPACT:* A statement concerning the impact of the technology on the economy.

❹ *POLITICAL IMPACT:* A statement concerning the impact of the technology on politics, laws, and regulations, and the impact of politics on the development of the technology.

❺ *ERGONOMIC IMPACT:* A statement concerning the ergonomic implications of the technology. Ergonomics is the study of developing products and systems that meet peoples' needs.

STUDENT'S SECTION

Impact Statements offer the student the opportunity to see beyond the activities in the Technology Learning Lab and glimpse the real-world applications of the technology.

Career Search

Also on Day Eight, the students are given the assignment of investigating several career opportunities related to the technology of the TLA. The investigation is done with *Career Search Abstracts*. A list of up to five careers related to the TLA is given, followed by pages from *Career Search Abstracts* that detail the career qualifications and work environment. The student is required to choose two of the five related careers, read the appropriate abstracts, then write a short essay about why those careers may be appealing.

Posttest Instructions

The students are required to take a Posttest as one of the last day's activities. The instructions for the Posttest are given in this section. The score for the Posttest may be compared to the score for the Pretest to help determine the student's gain during the TLA.

USING THIS PUBLICATION

STUDENT'S SECTION

Skunk Works

Skunk Works, a Day Eight optional activity, includes instructions that could be used for solving problems or reinforcing the enrichment of learning.

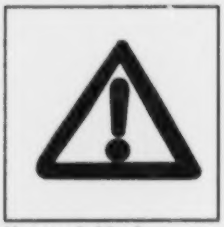
The term Skunk Works was used by engineers at 3M Corporation in the mid-1960s. Some engineers wanted to develop a new product, but company management would not give them the time or money to work on the project. So the engineers "borrowed" time and money from approved projects to work on their "Skunk Works." When they finished developing the product, they presented it to management, and it has been a 3M product ever since. The product: Velcro fasteners.

HAZARD ALERT MESSAGES

The Daily Activities include hazard alert information specific to the Activity. These messages should be discussed carefully and thoroughly. The Hazard Alert Message system used in the TLA is based on the American National Standards Institute (ANSI) Standard Z535, which provides for five levels of alert.

Students are introduced to the ANSI Hazard Alert Message system as an activity in the Laboratory Safety Design Briefs (TE1107/TE3107). This system was adopted by ANSI as the standard in 1990 and will be the hazard alert system in use when students reach the workplace.

Hazard Alert Messages in the TLA are indicated both by the color red and graphically. There are three types of hazard alert graphics used in the TLA: the hazard alert symbol, injury hazard graphics, and avoidance graphics.



Hazard Alert Symbol

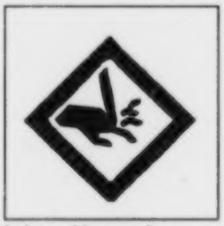
This Hazard Alert Symbol is used with the words DANGER, WARNING, and CAUTION. ANSI defines these words as:

DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

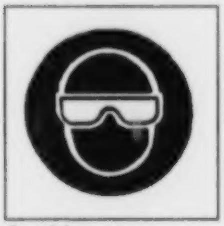
CAUTION indicates a hazardous situation which, if not avoided, may result in minor or moderate injury.

HAZARD ALERT MESSAGES



Injury Hazard Graphic

There are two types of graphics used in conjunction with the hazard alert symbol. This type of graphic depicts a specific injury that may be expected if the hazard described in the alert is not avoided.



Avoidance Graphic

This second type of graphic is called an avoidance graphic. It depicts an action the student should take in order to avoid injury.

There are two other ANSI words used in the TLAs, and the students should understand their meanings:

NOTICE indicates an action that could result in damage to property or equipment.

IMPORTANT indicates an instruction that can help the student do a better job.

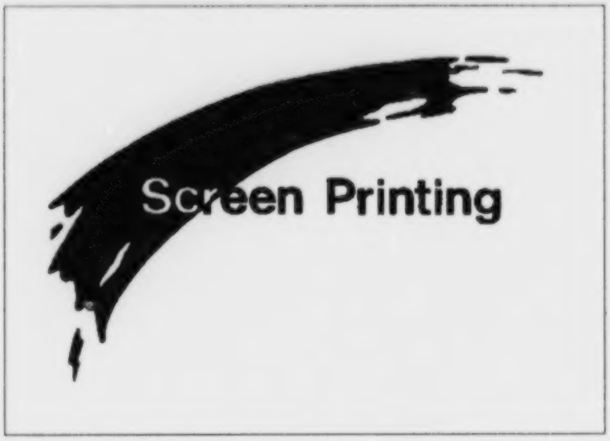
TECHNOLOGY EDUCATION

TECHNOLOGY
LEARNING
ACTIVITY

TE1119

THERMAL SCREEN PRINTING

INSTRUCTOR'S SECTION



Developed by the
Curriculum and Instructional Materials Center
for the Technology Education Division
Oklahoma Department of Vocational and Technical Education

BACKGROUND INFORMATION

INSTRUCTOR'S SECTION

Silkscreening is also commonly called the screen printing process. Now plastic has replaced the silkscreens. In thermal screen printing, a stencil made of plastic is attached to a screen. This screen is then placed over a substrate. The substrate is the material that will be printed on. A stencil is simply a material, like plastic or silk, with certain parts cut out. Ink or paint is forced through the cut-out areas of the stencil, forming words or a design on the substrate below.

The thermal screen printing process takes advantage of recent technology. The thermal properties of materials are their reactions to varying levels of heat. There are five main thermal properties:

♦ **Conductivity** — the ability to conduct heat through material.

♦ **Resistance** — the ability to resist melting.

♦ **Expansion** — The degree material expands in the presence of heat.

♦ **Emission** — the ability to give off or radiate heat.

♦ **Shock resistance** — the ability to withstand shock produced by rapid changes in temperature.

In thermal printing, the stencil is made by using heat to form an image in plastic.

—continued—

BACKGROUND INFORMATION

Now a machine called a thermal copier has made the stencil — making the process quicker and safer than before by using plastic screens to create stencils. The thermal plastic screen used has a low resistance when heated in contact with carbon. Thus, the carbon of the photocopied design image will melt into the emulsion on the plastic screen and form its image in the plastic. After the plastic screen is removed from the photocopy, the screen will have openings (holes) where the plastic bonded to the lines on the photocopy.

The stencil is attached to a screen and frame before the actual inking-printing process. The screen serves as a base for mounting the stencil and controlling the ink flow. The same screen can be used over and over again for many colors and stencils. Frames are usually made of plastic, wood, aluminum, or steel. The inner area of the frame should be at least two times the size of the print image.

This printing method works on almost all materials. As new materials are developed with current technology and these materials influence product development and advertising, the screen printing business adapts to operate with the new materials. While materials for screen printing used to include fabrics, furniture, wood and glass, now almost all manufactured goods can be screen printed. Screen printed materials now include wood; glass; many metals, like aluminum and steel; fabrics, from cotton to synthetics, and furs to leather; plastics; vinyl; and rubber.

—continued—

INSTRUCTOR'S SECTION

BACKGROUND INFORMATION

Screen printed products include calendars and greeting cards, posters and bumper stickers, drinking glasses and plastic bottles, T-shirts and hats, jackets and coats, windows and mirrors, soda cans and beer cans, furniture and signs. Screen printing can be performed for art, for commercial venture, or for private use by many organizations.

As the materials that can be printed develop, so do inks for printing them. Silkscreen inks dry very fast, often within 15 minutes, so it is easy to do multicolored prints in a few hours time. The color on silkscreened prints is brilliant and intense because it is directly applied. Choosing the proper kind of ink for a specific printing job requires that you know the type of screen, the type of stencil, and the material that will be printed on. Inks are developed for specific uses and effects with the variety of materials that exist.

Some inks have very narrow and specific uses, others have wider uses, but all must be chosen very carefully. The following is a list of some common screen printing inks:

♦ **Enamel ink** is used for decals, cardboard, POP displays, metal, glass, wood, and paper.

♦ **Plastisol ink** is used for knitted or woven fabrics, or a release paper for plastisol transfers.

—continued—

INSTRUCTOR'S SECTION

BACKGROUND INFORMATION

INSTRUCTOR'S SECTION

- **Mular ink** is used for polyester, metal, and rubber.

- **Vinyl ink** is used for rigid or flexible vinyl.

- **Glass etch ink** is used for putting frost on glass surfaces.

- **Conductive ink** is used for surfaces where an electrical current path is needed.

- **Magnetic ink** is used for surfaces where a magnetic ink film is required.

- **Poster and fluorescent poster inks** are used for printing on paper, cardboard, wallpaper, and greeting cards.

- **Textile dye** is used on fabrics with at least 50% material content and as a transparent ink.

- **Flock adhesive ink** can be used on any cloth, such as an athletic jersey.

- **Water-based textile ink** is used for fabrics, like cotton. This ink is water-soluble, meaning it dissolves and cleans easily with water before it is allowed to dry. This ink must be heat set once it dries to help the ink adhere to the fabric.

- **Water-base-pull ink** is used on textiles where "fake embroidery" is desired; also called bubble ink.

— continued —

BACKGROUND INFORMATION

◆ **Lacquer ink** can be used on paper, cardboard, metal, glass, and wood.

Regardless of the type of ink used, care should be taken so that inks are not allowed to dry or become contaminated. Only one pallet knife per bottle should be used, and each knife should be washed thoroughly after each use. Inks should not be mixed. Do not even mix inks of the same type when they come from different bottles.

Spreading the ink across the screen once the screen is in place and forcing the ink through the holes of the stencil will print the stencil's design on the substrate below. The ink used to be brushed through the holes, but now this time-consuming stencil brush has been replaced by the squeegee. A squeegee is a rubber blade with a smooth wooden or aluminum handle across its top. The squeegee should be two inches shorter than the inside area of the frame.
The squeegee should be held firmly in both hands to control the flow of ink through the screen and stencil.

INSTRUCTORS NOTE: Be sure that students understand before they begin the T-shirt printing activity that they must supply their own 100% cotton T-shirt. This T-shirt must be pre-washed before printing, so students should be made aware of these requirements at the earliest possible time in this TLA.

INSTRUCTOR'S SECTION

EXPECTED LEARNER OUTCOMES

- The student will explore career opportunities so that he or she can make meaningful occupational choices.
- The student will develop basic skills in the safe and proper use of tools, machines, materials, processes, and technical concepts.
- The student will recognize and develop individual talents.
- The student will think logically and sequentially.
- The student will become a more sophisticated consumer of the goods and services of a technological society.
- The student will apply design, imagination, and creative abilities.

The student will learn applications of lifelong learning skills.

- The student will think globally and act locally.

INSTRUCTOR'S SECTION

SUGGESTED ACTIVITIES

✓ Obtain materials to supplement the TLA.

✓ *Note: See Suggested Resources for books to supplement this module.*

✓ Review instructional outline for this TLA. Modify time frames to suit class needs and plan activities for each class period.

✓ Study the specific objectives to determine those you will cover in your presentation. Decide also which objectives should be taught to which students.

✓ Determine the scope and sequence of objectives that you add to the TLA. Design and develop support materials, including evaluation techniques, for additional objectives.

✓ Determine how you will schedule time for students to demonstrate competence in the required procedures.

✓ Make arrangements for guest speakers. Supply speakers with specific objectives and other appropriate sections of this TLA.

— continued —

PREPARATION

SUGGESTED ACTIVITIES

✓ Make arrangements to tour a local screen printing firm; and find printing concepts book showing different screen printing stencils and print images.

INSTRUCTOR'S SECTION

SUGGESTED RESOURCES

WORKSTATION BOOKSHELF

Fales, James F., et.al. *Technology: Today and Tomorrow*, Glencoe Publishing Co.: Mission Hills, CA, 1988.

Lindbeck, John R., et.al. *General Industry & Technology*, Glencoe Publishing Co.: Mission Hills, CA, 1986.

Prust, Z.A. *Graphic Communications*, The Goodheart-Willcox Co.: South Holland, IL, 1989.

Wright, R. Thomas. *Manufacturing Systems*, The Goodheart-Willcox Co.: South Holland, IL, 1990.

INSTRUCTOR'S REFERENCE MATERIALS

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Wright, R. Thomas. *Manufacturing Systems*, The Goodheart-Willcox Co.: South Holland, IL, 1990.

Instructional Sequence

Technology Education: Thermal Screen Printing

Assignments	Equipment, Tools, and Supplies	Facilities Requirements/ Modifications
Day 1	Take Pretest. Read and study the Assignment Checklist, Words You Should Know, Expected Learner Outcomes, Objectives, TSA Events, and Academic and Workplace Skills.	Computer score card/sheet for Pretest.
Day 2	Complete Objective 1: Design an image for printing using the thermal screening process. Draw five rough drafts. Complete Objective 2: Evaluate and select one draft to become the final print design.	T-square or ruler Paper: 8.5 x 11", 5 sheets Pencil with eraser
Day 3	Complete Objective 3: Draw the final draft of your print design in ink.	Selected draft of print design T-square or ruler Paper: 8.5 x 11", 1 sheet Pencil with eraser Dark colored felt-tip ink pen Liquid paper
Day 4	Complete Objective 4: Photocopy your final design. Complete Objective 5: Use the thermal copier to make a stencil of your print design.	Final ink drawing of print design Photocopy machine Plastic thermal screen (with paper backer for carrier) Thermal copier machine

Instructional Sequence

Technology Education: Thermal Screen Printing

Assignments	Equipment, Tools, and Supplies	Facilities Requirements/ Modifications
Day 5	Complete Objective 6: Use screen and stencil to print a poster.	Stencil of print design Screen and plastic frame Masking tape, 1 roll Poster printing ink, 1 jar Pallet knife Squeegee Paper: heavy posterboard
Day 6	Complete Objective 7: Use screen and stencil to print a second poster.	Stencil of print design Screen and plastic frame Masking tape, 1 roll Poster printing ink, 1 jar Pallet knife Squeegee Paper: heavy posterboard
Day 7	Complete Objective 8: Use screen and stencil to print a T-shirt. Complete Objective 9: Heat-set the ink in the print design of the T-shirt after ink has dried overnight.	Stencil of print design Screen and plastic frame Masking tape, 1 roll Poster printing ink, 1 jar Pallet knife Squeegee Water-based textile printing ink, 1 jar 100% cotton T-shirt or sweatshirt Iron Paper: 8.5 x 11", 1 sheet
Day 8	Complete any incomplete assignments. Read and study Impact Statements. Complete Career Search Activity. Take Posttest and Spelling Test. Hand in assignments. Complete Skunk Works, if time.	Computer score card/sheet for Posttest and Spelling Test.

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Equipment, Tools, and Supplies: Summary Worksheet

Equipment, Tools, and Supplies	Per Student	Per Period	Total Needed	Special Considerations	Cost per Student	Cost per Period	Total Cost	Special Considerations
T-square or ruler	1	24						
Paper (8.5 x 11")	7	for 24						
Pencil with eraser	1	24						
Dark-colored felt-tip ink pen	1	24						
Liquid paper	1	1						
Photocopy machine		1						
Plastic thermal screen	1	24						
Carrier	1	24						
Thermal copy machine		1						
Computer score card/sheet	1	for 24						
Posterboard (8.5 x 11")	2	48						
Masking tape (roll)		for 24						
Poster printing ink	1 jar	for 24						
Water-based textile ink	1 jar	for 24						
Pallet knife	1	for 24						
Squeegee	1	for 24						
Screen and frame	1	for 24						
100% cotton T-shirt or sweatshirt (prewashed)	1	24						
Iron	1	for 24						

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PRETEST

INSTRUCTOR'S SECTION

Part 1

1. Stencils have been used dating as far back as:

   a. the ancient Egyptians
   b. prehistoric cavemen
   c. dinosaurs
   d. the early Tibetans

2. The lines in photocopies contain a substance called:

   a. ink
   b. lead
   c. carbon
   d. plastic

3. In the thermal screen printing process, the tool used to force the ink through the screen is called:

   a. frame
   b. X-Acto knife
   c. stencil brush
   d. squeegee

PRETEST

INSTRUCTOR'S SECTION

PART 2

4. Heating a thermal plastic screen and photocopy together causes:

   a. the image to cut the stencil
   b. the image to erase
   c. the two to melt together
   d. the photocopy to burn up

5. In order to prepare a final draft of your print design, your drawing should be:

   a. a computer print-out
   b. in pencil
   c. in ink
   d. in crayon

6. Which of the following is NOT an ink that can be used in screen printing?

   a. plastisol
   b. glass etch
   c. water-based textile
   d. ball-point pen

7. Developing a rough draft of a print design means:

   a. putting your ideas in writing
   b. drawing your ideas on paper
   c. copying someone else's art
   d. taking a photograph

PRETEST

INSTRUCTOR'S SECTION

8. The thermal copier is a machine that makes:
   - a. a screen
   - b. a frame
   - c. a stencil
   - d. an art design

9. For screen printing, you must tape which items together?
   - a. screen and stencil
   - b. frame and screen
   - c. thermal copier and frame
   - d. drawing and stencil

10. A plastic thermal screen contains a coating called:
    - a. plastique
    - b. screen wax
    - c. thermosol
    - d. emulsion

PART 3

POSTTEST

INSTRUCTOR'S SECTION

Part 1

11. Stencils have been used dating as far back as:

    a. the ancient Egyptians
    b. prehistoric cavemen
    c. dinosaurs
    d. the early Tibetans

12. The lines in photocopies contain a substance called:

    a. ink
    b. lead
    c. carbon
    d. plastic

13. In the thermal screen printing process, the tool used to force the ink through the screen is called:

    a. frame
    b. X-Acto knife
    c. stencil brush
    d. squeegee

POSTTEST

14. Heating a thermal plastic screen and photocopy together causes:

    a. the image to cut the stencil
    b. the image to erase
    c. the two to melt together
    d. the photocopy to burn up

15. In order to prepare a final draft of your print design, your drawing should be:

    a. a computer print-out
    b. in pencil
    c. in ink
    d. in crayon

16. Which of the following is NOT an ink that can be used in screen printing?

    a. plastisol
    b. glass etch
    c. water-based textile
    d. ball-point pen

17. Developing a rough draft of a print design means:

    a. putting your ideas in writing
    b. drawing your ideas on paper
    c. copying someone else's art
    d. taking a photograph

INSTRUCTOR'S SECTION

Part 2

POSTTEST

18. The thermal copier is a machine that makes:

    a. a screen
    b. a frame
    c. a stencil
    d. an art design

19. For screen printing, you must tape which items together?

    a. screen and stencil
    b. frame and screen
    c. thermal copier and frame
    d. drawing and stencil

20. A plastic thermal screen contains a coating called:

    a. plastique
    b. screen wax
    c. thermosol
    d. emulsion

INSTRUCTOR'S SECTION

Part 3

SPELLING TEST

21. stencel
22. thermal copier
23. transaparent
24. carbon dust
25. x-acto knife
26. screening procces
27. emmulsion
28. water-based textile ink
29. squeggee
30. plastik screen

TEST ANSWERS

1. B
2. C
3. D
4. A
5. C

6. D
7. B
8. C
9. A
10. D

11. B
12. C
13. D
14. A
15. C

16. D
17. B
18. C
19. A
20. D

21. B
22. A
23. B
24. A
25. A

26. B
27. B
28. A
29. B
30. B

PRETEST ANSWERS

POSTEST ANSWERS

SPELLING TEST ANSWERS

EVALUATION SUMMARY

10 POINTS EACH:

✓ Career Search. ____

✓ Activity 1: Draw 5 different rough drafts of your print design. ____

✓ Activity 2: Evaluate and select one draft for final print design. ____

✓ Activity 3: Use final print design to develop final drawing. ____

✓ Activity 4: Operate photocopier to copy final drawing. ____

✓ Activity 5: Operate thermal copier to make plastic stencil. ____

✓ Activity 6: Use screen and stencil to print a poster of final design. ____

✓ Activity 7: Use screen and stencil to print a second poster of final design. ____

✓ Activity 8: Use screen and stencil to print a T-shirt of final design. ____

✓ Activity 9: Heat set the ink of T-shirt print after ink has dried. ____

TOTAL POSSIBLE POINTS: 100

INSTRUCTOR'S SECTION

1. PROCESS EVALUATION

PROCESS EVALUATION SCORE ________

EVALUATION SUMMARY

The instructor is encouraged to individualize the TLA to address the specific needs of each student, considering age and ability level. In addition to the specific areas on the chart below, the instructor should take into account the student's desire, enthusiasm, etc.

Instructors should evaluate students individually by using the appropriate grading criteria for whichever TSA Competitive Event each student chooses. Students may choose the TSA event for Graphic Design, Illustration Presentation, Manufacturing Prototype, or Material Processes.

Instructors will need to fill in the criteria and point values for each criteria in the following chart by looking at the appropriate Judge's rating sheets in *TSA 1992-94 Curricular Resources Guide.*

- TSA Graphic Design judging criteria: pp. 62-65.
- Illustrated Presentation judging criteria: pp. 66-70.
- TSA Manufacturing Prototype judging criteria: pp. 71-73.

—continued—

2. PRODUCT EVALUATION

EVALUATION SUMMARY

Evaluation based upon observed performance = 100 possible points.

EVALUATION RATING TABLE

Student Name:______________

Criteria	Points Possible
__________	_____
__________	_____
__________	_____
__________	_____
__________	_____
__________	_____
__________	_____
__________	_____

INSTRUCTOR'S SECTION

2. PRODUCT EVALUATION

Points Earned

______
______
______
______
______
______
______
______

PRODUCT EVALUATION SCORE______

EVALUATION SUMMARY

Pretest Score = ________

Career Search = ________

Post Test Score = ________

Spelling Test Score = ________

EVALUATION WORKSHEET

1. Process Evaluation Score ________
2. Product Evaluation Score ________
3. Written Evaluation Score ________
4. Total Score ________
5. Grade (Divide the total score by 3) ________

INSTRUCTOR'S SECTION

3. WRITTEN EVALUATION

3. WRITTEN EVALUATION SCORE ______

TLA SCORE ______

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TSA 1992-94 Curricular Resources Guide, Reston, VA: Technology Students Association, 1990.

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TECHNOLOGY EDUCATION

TECHNOLOGY

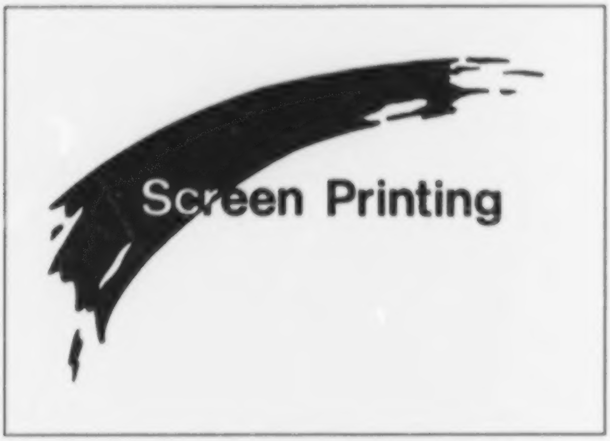
LEARNING

ACTIVITY

TE3119

THERMAL SCREEN PRINTING

Suggested Time: 8 Days



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TECHNOLOGY EDUCATION THERMAL SCREEN PRINTING

On Day 1 you should complete the following activities:

1. Complete Pretest
2. Read Assignments to Turn In (items to complete in 8 days)
3. Read Goal
4. Read Words You Should Know
5. Read Expected Learner Outcomes
6. Read Objectives
7. Read Related TSA Competitive Events
8. Read Academic and Workplace Applications

DAY 1 ACTIVITIES

SUMMARY OF ACTIVITIES

Reading Comprehension Skills:
- ♦ Gain factual information.

Research and Reference Skills:
- ♦ Select useful resources.
- ♦ Follow written instructions.

PRETEST

INSTRUCTIONS

You will need a computer scan sheet or card to record your answers to the following Pretest. Be sure to write your name, the title of the TLA, the date, and the class period on the computer scan sheet using a #2 pencil. Use rows 1-10 to record the answers to the Pretest. If your answers will be hand-scored, use a blank sheet of notebook paper to record your answers, and number your answers 1-10.

Get the Pretest Questions from your instructor.

TECHNOLOGY EDUCATION THERMAL SCREEN PRINTING

DAY 1 ACTIVITIES

ASSIGNMENTS TO TURN IN

At the end of eight days, you should give the following items to your instructor for evaluation:

1. Computer score card/sheet with answers to the following:
   a) Pretest
   b) Posttest (including Spelling Test)
2. Drawings of your print design:
   a) Rough draft drawings of 5 different versions.
   b) Final draft drawing.
3. Stencil of your print design.
4. Screen-printed poster.
5. Screen-printed T-shirt.
6. Career Search Activity:
   a) Two occupations identified
   b) Explanation of why those occupations appealed to you.

TECHNOLOGY EDUCATION THERMAL SCREEN PRINTING

DAY 1 ACTIVITIES

GOAL

The Thermal Screen Printing TLA will help you learn the importance to business and industry of the screen printing process. You will apply the same general procedures for designing and printing an image that many commercial companies use for products such as clothing, calendars, drinking glasses, mirrors, vinyl binders, and wood products.

TECHNOLOGY EDUCATION THERMAL SCREEN PRINTING

DAY 1 ACTIVITIES

WORDS YOU SHOULD KNOW

Carbon dust — the substance on the image area of a photocopy.

Carrier — the white sheet of paper on the back of the thermal plastic screen.

Heat set — the process of ironing over the printed artwork with a hot iron to make it adhere to the fabric better.

Margin — the outer part of the screen and frame that is outside the area of the artwork being printed.

Screen — the fabric that is stretched tightly across the frame. The stencil is attached to the screen.

Stencil — the artwork that will be printed forms a cut-out area in the thermal plastic screen. The screen with the cut-out is the stencil.

Squeegee — a thick piece of rubber or plastic with a wooden handle used to force ink through the stencil onto the print material below.

Substrate — the material that is printed. For example, a poster or T-shirt.

Thermal copier — a special copy machine that uses heat to place your artwork on a stencil.

Thermal plastic screen — a type of screen that allows the ink to pass through it and create the artwork design on the substrate below.

TECHNOLOGY EDUCATION THERMAL SCREEN PRINTING

DAY 1 ACTIVITIES

EXPECTED LEARNER OUTCOMES

- ➢ You will explore career opportunities so that you can make meaningful occupational choices.
- ➢ You will develop basic skills in the safe and proper use of tools, machines, materials, processes, and technical concepts.
- ➢ You will recognize and develop individual talents.
- ➢ You will think logically and sequentially.
- ➢ You will become a more sophisticated consumer of the goods and services of a technological society.
- ➢ You will apply design, imagination, and creative abilities.
- ➢ You will learn applications of lifelong learning skills.
- ➢ You will think globally and act locally.

TECHNOLOGY EDUCATION THERMAL SCREEN PRINTING

DAY 1 ACTIVITIES

OBJECTIVES

At the completion of this Technology Learning Activity you should be able to:

1. Draw at least 5 different rough drafts of your print design.
2. Select a print design by evaluating your rough drafts and choosing the best.
3. Use your selected design to develop a final drawing.
4. Produce a plastic stencil by operating a photocopier and a thermal copier.
5. Use your screen and stencil to print your design on a poster.
6. Use your screen and stencil to print your design on a T-shirt.
7. Heat set the ink of your printed design after the ink has dried overnight.

TECHNOLOGY EDUCATION THERMAL SCREEN PRINTING

DAY 1 ACTIVITIES

Related TSA Competitive Events

The following TSA Competitive Events apply to your study of Thermal Screen Printing.

- ➢ Graphic Design
- ➢ Illustrated Presentation
- ➢ Manufacturing Prototype
- ➢ Material Processes

See *TSA Competitive Events Guidelines* for specific details on the competitions.

TECHNOLOGY EDUCATION THERMAL SCREEN PRINTING

The symbols in the right column are used to identify the Academic and Workplace Applications that are reinforced by specific activities in this TLA.

Creative Thinking Skills Applied:

- ♦ Create a finished product.
- ♦ Develop alternatives.
- ♦ Evaluate alternatives.
- ♦ Evaluate results.

Reading Skills Applied:

Reading Comprehension Skills:

- ♦ Gain factual information.
- ♦ React to written material.

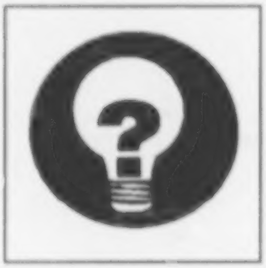
Functional Reading Skills:

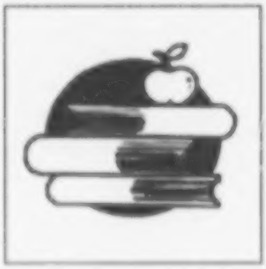
- ◆ Follow written instructions.
- ◆ Use content area vocabulary.

If you finish Day 1 Activities with time left over, you may begin Day 2 Activities.

DAY 1 ACTIVITIES

ACADEMIC AND WORKPLACE APPLICATIONS





TECHNOLOGY EDUCATION THERMAL SCREEN PRINTING

DAY 2 ACTIVITIES

On Day 2 you should complete the following activities:

❶ Read Information Sheet

❷ Complete Objective 1

❸ Complete Objective 2

SUMMARY OF ACTIVITIES

Creative Thinking/Problem Solving Skills:

- ♦ Create a finished product.
- ♦ Apply intuitive thinking techniques.
- ♦ Develop alternatives.
- ♦ Evaluate alternatives.

TECHNOLOGY EDUCATION THERMAL SCREEN PRINTING

DAY 2 ACTIVITIES

INFORMATION SHEET

INTRODUCTION

Silkscreening is also called the screen printing process. This printing method is basically uncomplicated and requires little technical knowledge. It is an art that calls for manual and mental skills. The more you do it, the easier it becomes. What seems awkward at first will, with practice, become more natural.

The Chinese, Egyptians, and Japanese are credited with first developing screen printing. The Japanese were the first to combine a stencil with a screen for printing. A stencil is simply a material, like plastic or silk, with certain parts cut out. Around 1900, American commercial artists started printing with a wooden frame with silk stretched tightly across it, and the art of silkscreening was born.

Now plastic has replaced the silk for screen printing. In thermal screen printing, a plastic stencil is attached to a screen. This screen is then placed over the surface to be printed. The printer then forces ink or paint through the cut-out areas, forming words or a design on the surface below.

Using the thermal screen printing process, you will print your own design. All kinds of visual effects are possible from large, flat areas of rich color to delicate transparent shadings, from thin, precise lines to photographic images.

INTRODUCTION
(continued)

Your first step is to produce some rough drafts of a design. You will put some of your design ideas on paper and draw out different versions of the idea. You will be able to use your imagination to create an original design of your own.

You will design an image for printing. Include a drawing of an object as well as some lettering to go with it. You may use books, magazines or other pictures for ideas, but DO NOT copy them exactly. Use your imagination to change and improve your design until you are pleased with it.

Your drawings can be rough, but should be good enough to show other students what ideas you have developed.

TECHNOLOGY EDUCATION THERMAL SCREEN PRINTING

Draw at least 5 different rough drafts of your print design.

- Five sheets of paper (8½ x 11")
- T-square or ruler (optional)
- Pencil with eraser

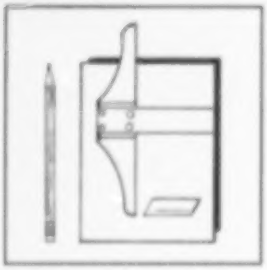
FOLLOW THESE STEPS:

STEP 1: Draw your first version of your design idea on one sheet of paper.

DAY 2 ACTIVITIES

OBJECTIVE 1

TOOLS AND MATERIALS



PROCEDURES

TECHNOLOGY EDUCATION THERMAL SCREEN PRINTING

DAY 2 ACTIVITIES

FOLLOW THESE STEPS:

STEP 2: Draw a second version of your print design on a second sheet of paper. You may use parts of your first draft, but arrange them in a different order. Or your second design may be completely different from your first design.

STEP 3: Draw a third different version of your print design on a third sheet of paper.

FOLLOW THESE STEPS:

STEP 4: Draw a fourth different version of your print design on a fourth sheet of paper.

STEP 5: Draw a fifth different version of your print design on a fifth sheet of paper.

Continue Day 2 Activities with Objective 2.

TECHNOLOGY EDUCATION THERMAL SCREEN PRINTING

DAY 2 ACTIVITIES

OBJECTIVE 2

Select a print design by evaluating your rough drafts and choosing the best.

PROCEDURES

FOLLOW THESE STEPS:

STEP 1: Lay your five drafts side by side to look at them.

STEP 2: With the help of your instructor, select the design version that you think is the best. This is the design that you will use to make your final draft.

STEP 3: Write your name on the back of each draft version of your design. Also indicate which design you have selected for your print design.

STEP 4: When you complete Objectives 1 and 2, return all materials to their proper storage area and clean your work area.

If you finish Day 2 Activities with time left over, you may begin Day 3 Activities.

TECHNOLOGY EDUCATION THERMAL SCREEN PRINTING

DAY 3 ACTIVITIES

On Day 3 you should complete the following activity:

1. Complete Objective 3

SUMMARY OF ACTIVITIES

Writing Skills:
- Construct graphics and symbols.
- Proofread and edit.
- Use correct spelling.

TECHNOLOGY EDUCATION THERMAL SCREEN PRINTING

DAY 3 ACTIVITIES

INTRODUCTION

You will use the print design you chose yesterday as a guide for carefully drawing the final version.

You will begin with a pencil and later trace your drawing with a black felt-tip pen. You must be sure to erase or "white out" all mistakes to produce lines that are clear and sharp for photocopying.

A computer-generated draft would also work. If you have one you like better than the designs you made yesterday, talk to your instructor.

For thermal screen printing, you must have a photocopy of your final design to make your stencil. You will make the copy tomorrow.

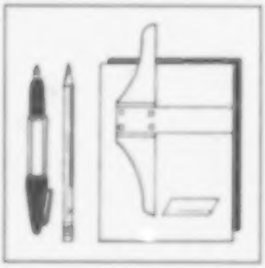
TECHNOLOGY EDUCATION THERMAL SCREEN PRINTING

DAY 3 ACTIVITIES

OBJECTIVE 3

Use your selected design to develop a final drawing.

TOOLS AND MATERIALS



- Rough draft of your selected design
- Plain white paper (8 1/2 X 11")
- T-square or ruler (optional)
- Pencil with eraser
- Black felt-tip ink pen
- Correction fluid

TECHNOLOGY EDUCATION THERMAL SCREEN PRINTING

DAY 3 ACTIVITIES

FOLLOW THESE STEPS:

STEP 1: Redraw your selected design in pencil. You may use your rough draft as a guide, and may trace any difficult parts from the rough draft.

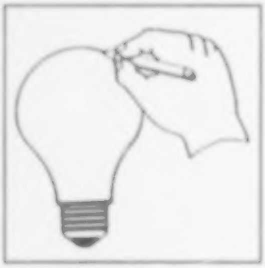
IMPORTANT

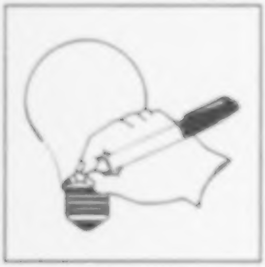
Draw lightly or use a #3 drafting pencil, so you can easily erase mistakes.

STEP 2: Check the accuracy of your drawing and lettering.

STEP 3: Trace your pencil lines with a black felt-tip pen.

PROCEDURES



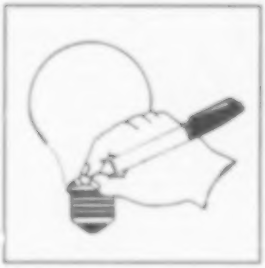


TECHNOLOGY EDUCATION THERMAL SCREEN PRINTING

DAY 3 ACTIVITIES

FOLLOW THESE STEPS:

STEP 4: Blacken all dark areas.



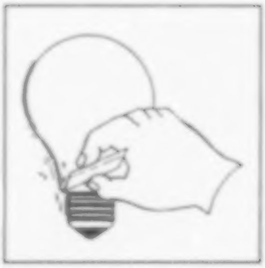
NOTICE

Any marks that you do not erase or "white out" will show up when your drawing is photocopied and will be printed during the screening process.

Steps 6 through 8 will allow you to correct any mistakes in your drawing that can affect the quality of your print.

STEP 6: Examine your drawing for mistakes.

STEP 7: Erase any pencil marks that show.

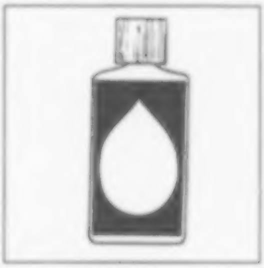


TECHNOLOGY EDUCATION THERMAL SCREEN PRINTING

DAY 3 ACTIVITIES

FOLLOW THESE STEPS:

STEP 8: White out any incorrect ink lines.



STEP 9: Show your final drawing to your instructor for approval.

STEP 10: When you complete Objective 3, return all materials to their proper storage area and clean your work area.

If you finish Day 3 Activities with time left over, you may begin Day 4 Activities.

TECHNOLOGY EDUCATION THERMAL SCREEN PRINTING

DAY 4 ACTIVITIES

On Day 4 you should complete the following activities:

❶ Read the Introduction

❷ Complete Objective 4

❸ Complete Objective 5

SUMMARY OF ACTIVITIES

Creative Thinking/Problem-Solving Skills:
- Apply new technology.
- Transfer knowledge/training to new situations.
- Evaluate results/outcomes.

TECHNOLOGY EDUCATION THERMAL SCREEN PRINTING

DAY 4 ACTIVITIES

INTRODUCTION

Stenciling is a very old art form. The first stencil was the human hand. Prehistoric man blew pigment (a powdered color) against the back of the hand to form an outline of the hand. This left the inside image blank like a stencil. Evidence also suggests that cave paintings were made by using stencils cut from large leaves to repeat images. Stenciling has been used in the folk art of many nations for decorating walls, fabrics, and furniture. Until very recently, stencils used to be made by cutting the design image into the screen material with a thin, sharp blade.

Now, a machine called a thermal copier has made the stencil process easier by using plastic screens and a heat copier to put the design image on the screen. This process is also safer, since it eliminates the need for using a sharp knife. The whole process is quicker, leaving more time to be creative with your designs.

For thermal screen printing, you need to photocopy your final design drawing to make your stencil. This photocopy will contain carbon dust on the lines you have drawn. Carbon is necessary for the thermal copier to make your plastic stencil.

— continued —

TECHNOLOGY EDUCATION THERMAL SCREEN PRINTING

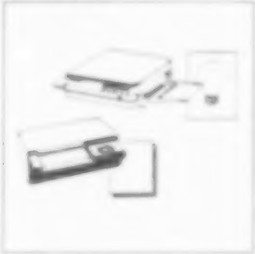
DAY 4 ACTIVITIES

INTRODUCTION
(CONTINUED)

The carbon dust (image area) side of your photocopy must face the shiny side of the thermal plastic screen. This shiny side contains an emulsion (a coating) that will bond with the carbon of your photocopy when heated. This plastic is called a thermoplastic, and is made of materials called polyvinylchloride (PVC).

When you feed your photocopy and thermal plastic screen into the thermal copier, this machine heats the thermal plastic screen so that the emulsion bonds to the carbon lines on your photocopy. After the thermal plastic screen is removed from your photocopy, the screen will have openings (holes) where the plastic bonded to the lines on your photocopy. These openings are your stencil.

TOOLS AND MATERIALS



- Final ink drawing of your ink design
- Photocopy machine
- Plastic thermal screen
- Carrier for thermal copier (paper that backs the plastic thermal screen)
- Thermal copier machine

TECHNOLOGY EDUCATION THERMAL SCREEN PRINTING

Operate the photocopier to prepare a copy with carbon dust of your final print design.

FOLLOW THESE STEPS:

STEP 1: Take your final ink draft of your print design to a photocopier.

NOTICE

Ask your instructor for assistance with the copier.

STEP 2: Photocopy your design.

IMPORTANT

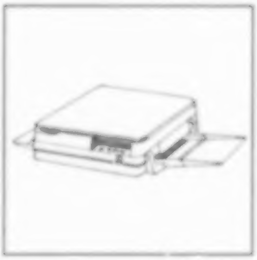
If you find any mistakes, correct them and erase stray lines now. All lines that show will affect the quality of your print.

STEP 3: Examine your photocopy to make sure that it is good and clear.

DAY 4 ACTIVITIES

OBJECTIVE 4

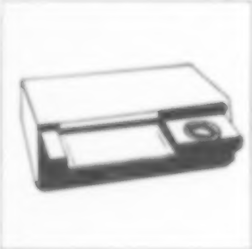
PROCEDURES



TECHNOLOGY EDUCATION
THERMAL SCREEN PRINTING

DAY 4
ACTIVITIES

STEP 4: Take your photocopy to the thermal copier.



OBJECTIVE 5

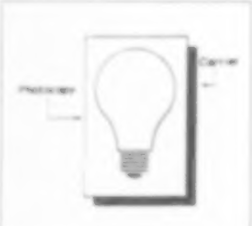
Operate the thermal copy machine to produce a plastic stencil for making a screen print.

PROCEDURE

FOLLOW THESE STEPS:

CAUTION
HOT MACHINE can cause burns. Ask your instructor for assistance with using the thermal copier.

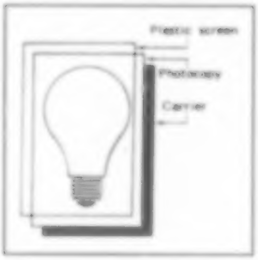
STEP 1: Place your photocopy on the carrier with the carbon side up. Use the white paper backing that came with your plastic thermal screen as the carrier.



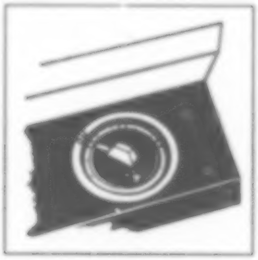
TECHNOLOGY EDUCATION THERMAL SCREEN PRINTING

DAY 4 ACTIVITIES

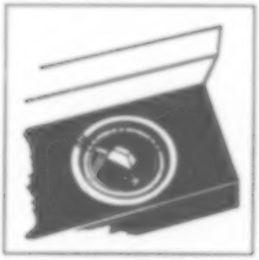
STEP 2: Place the shiny, emulsion side of the thermal plastic screen against the carbon side of your photocopy, so that these two sides face each other.



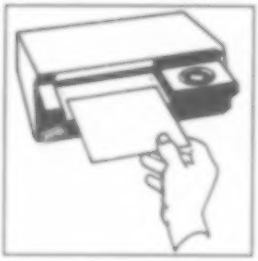
STEP 3: Turn the thermal copier ON.



STEP 4: Set the temperature of the thermal copier between the medium and low settings.



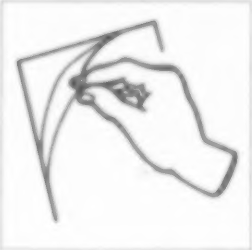
STEP 5: Feed the carrier, with the drawing and thermal plastic screen, into the thermal copier with the emulsion side up.



TECHNOLOGY EDUCATION THERMAL SCREEN PRINTING

DAY 4 ACTIVITIES

STEP 6: Carefully lift one corner of the screen to see if it is sticking to your photocopy. This will show you if the emulsion of the stencil is bonding to the carbon of the photocopy.

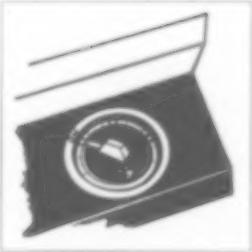


IMPORTANT

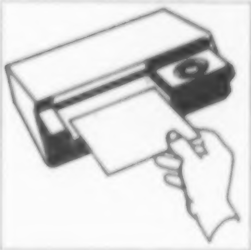
If the plastic coating is sticking to your photocopy, proceed to Step 10.

STEPS 7 - 9 will allow you to get the plastic coating of the thermal screen to bond with your photocopy.

STEP 7: Increase the temperature of the thermal copier.



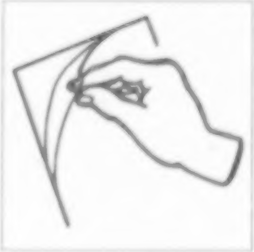
STEP 8: Feed the carrier with the thermal plastic screen and your photocopy into the thermal copier again.



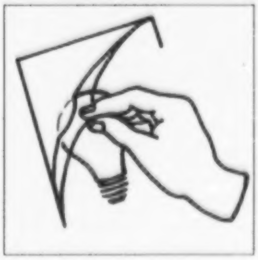
NOTICE

If the plastic coating is not sticking to your photocopy after a second time through the thermal copier, seek your instructor's assistance.

STEP 9: Carefully lift one corner of the screen to see if it is sticking to your photocopy. This will show you if the emulsion of the stencil is bonding to the carbon of the photocopy.



IMPORTANT
Be very careful NOT to fold or tear your stencil, because it could affect the quality of your screen print.



STEP 10: Separate the screen from the copy. The image area of your design should leave an opening in the screen that is the same shape as your drawing. This plastic screen is now your stencil for printing.

STEP 11: Turn in your stencil to your instructor.

STEP 12: When you complete Objectives 4 and 5, clean and return all tools and materials to their proper storage areas and clean your work area.

If you finish Day 4 Activities with time left over, you may begin Day 5 Activities.

TECHNOLOGY EDUCATION THERMAL SCREEN PRINTING

On Day 5 you should complete the following activity:

❶ Complete Objective 6

DAY 5 ACTIVITIES

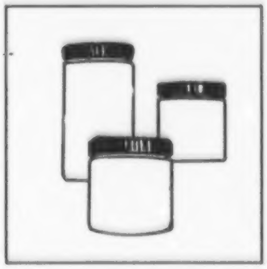
SUMMARY OF ACTIVITIES

Creative Thinking/Problem-Solving Skills:
- Apply new technology.
- Evaluate results.
- Create finished product.

INTRODUCTION

In the screen printing process, the same screen can be used over and over again for many colors and prints. It is easy to produce as many prints as you want without a decrease in quality. It is also possible to print on almost any kind of surface. This printing method works on almost all materials, including fabrics, glass, plastic, wood, and many metals. Because it is possible to print onto many materials, screen printed products include drinking glasses and cans, clothing, mirrors and windows, and calendars and greeting cards.

Silkscreen inks dry very fast, often within fifteen minutes, so it is easy to do multicolored prints in a few hours time. The color on silkscreened prints is brilliant and intense because it is applied directly. Today, you will use a poster ink for printing on paper, and you will use a water-based textile ink for printing on fabrics later.



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TECHNOLOGY EDUCATION THERMAL SCREEN PRINTING

There are many kinds of inks available for screen printing. You must choose the type of ink to use by finding out the type of screen, the kind of stencil, and the material that will be printed. For example, a water-based ink will dissolve a water-based stencil, so combining these products would not work.

The stencil must be mounted on a frame. Frames are usually made of wood, aluminum, steel, or plastic. Once the stencil and frame are mounted together, the frame is placed over the object that will receive your design.

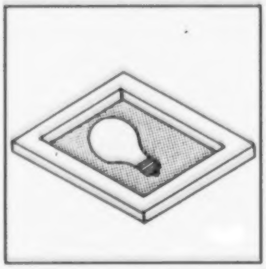
— continued —

DAY 5 ACTIVITIES

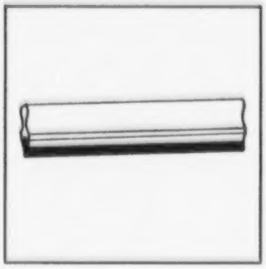
INTRODUCTION

Here are just a few of the other types of screen printing inks and their uses:

- Enamel ink — for decals, cardboard, metal, glass, and wood.
- Plastisol ink — for knitted or woven fabrics.
- Mular ink — for polyester (a man-made fabric), metal, and rubber.
- Vinyl ink — for rigid or flexible vinyl.
- Glass etch ink — for frosting glass surfaces.
- Conductive ink — for surfaces where an electrical current path is needed.



INTRODUCTION



Spreading ink across the screen once the screen is in place and forcing the ink through the holes of the stencil will print your design on the object below. The ink used to be brushed through the holes, but now this time-consuming technique has been replaced by the squeegee. A squeegee is a rubber blade with a smooth wooden or aluminum handle across its top. The squeegee you use should be at least 2" shorter than the inside of the frame.

Printing a poster will allow you to get the feel of the screen printing process before your print a T-shirt or sweatshirt.

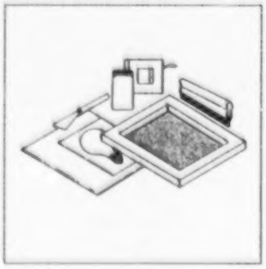
TECHNOLOGY EDUCATION THERMAL SCREEN PRINTING

DAY 5 ACTIVITIES

OBJECTIVE 6

Use your screen and stencil to print your design on a poster.

TOOLS AND MATERIALS



- Stencil of your print design
- Screen and plastic frame
- Masking tape
- One jar of poster printing ink
- Pallet knife
- One squeegee
- One sheet of heavy white poster paper

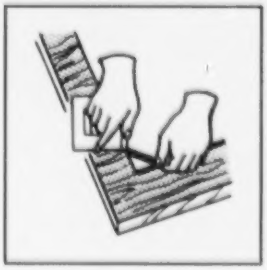
TECHNOLOGY EDUCATION THERMAL SCREEN PRINTING

DAY 5 ACTIVITIES

FOLLOW THESE STEPS:

PROCEDURE

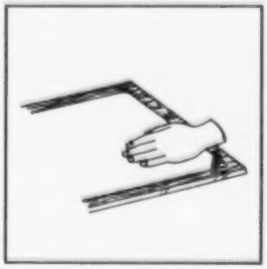
STEP 1: Tape your poster paper onto the wooden mounting board, using masking tape.



NOTICE

If there are any wrinkles or loose corners on the poster board, it will affect the quality of your print.

STEP 2: Check to be sure the poster paper is straight and tight.



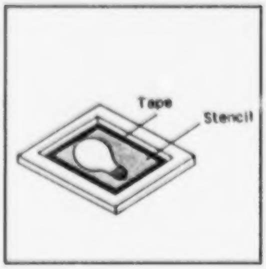
TECHNOLOGY EDUCATION THERMAL SCREEN PRINTING

DAY 5 ACTIVITIES

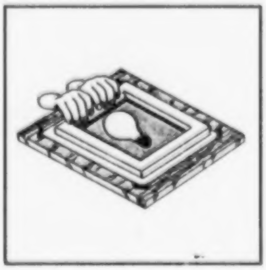
FOLLOW THESE STEPS:

STEP 3: Fasten your stencil to the screen and plastic frame with masking tape. Make sure that the emulsion (shiny) side of the stencil is down and facing the screen.

The stencil must be stretched tightly for the screen process to work.

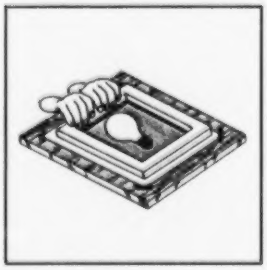


STEP 4: Place the frame with the mounted stencil over the poster paper, centering the screen on the paper.



NOTICE

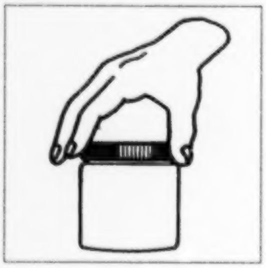
If the frame moves while you are printing, the quality of your print will be affected. Unless you are using the four-color press machine, you have no way to mount your stencil and screen to the poster paper. Get assistance with holding the frame securely during the inking process, Steps 5 through 9.



TECHNOLOGY EDUCATION THERMAL SCREEN PRINTING

DAY 5 ACTIVITIES

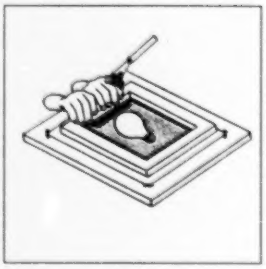
STEP 5: Open your jar of printing ink. Be sure that you are using water-soluble poster ink.



NOTICE

DO NOT spread ink within ½" along the edges of the stencil so that the ink doesn't bleed over onto the print.

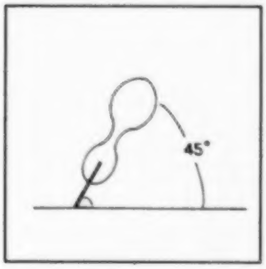
STEP 6: With someone holding the frame securely, use the pallet knife to spread ink across the top of the stencil. Remember to leave your ½" border.



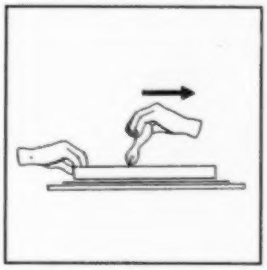
FOLLOW THESE STEPS:

Steps 7 through 9 will allow you to print your design onto the poster paper.

STEP 7: Hold the squeegee firmly with both hands at a 45° angle to the screen.



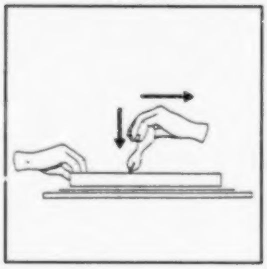
STEP 8: Pull the squeegee across the stencil to spread the ink. Use only one pass from top to bottom. If you use more than one pass, too much ink will bleed through.



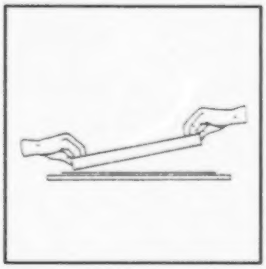
TECHNOLOGY EDUCATION THERMAL SCREEN PRINTING

DAY 5 ACTIVITIES

STEP 9: Use pressure with your hands to control the amount of ink that passes through the stencil and onto the poster paper.



STEP 10: Carefully lift the frame from the poster.



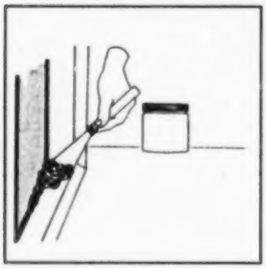
STEP 11: Allow the ink on your poster print to air dry.

IMPORTANT

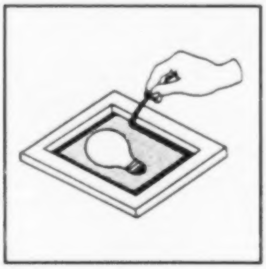
While waiting for your poster to dry, complete Steps 12 through 14.

FOLLOW THESE STEPS:

STEP 12: Scrape any left over ink from the screen and stencil back into the jar with the pallet knife and replace the lid.

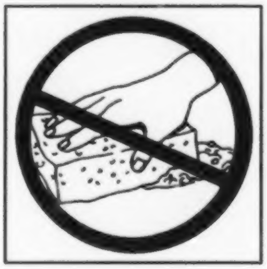


STEP 13: If your instructor says you must remove the stencil from the frame, be very careful as you untape the stencil from the screen and frame. If possible, leave the stencil on the frame, so there is less chance of the stencil tearing.



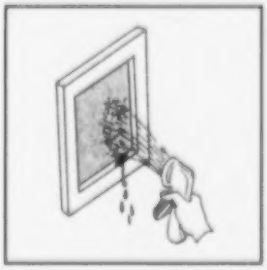
NOTICE

Carefully rinse and wipe your stencil. DO NOT scrub your stencil, or you may damage the emulsion and affect the quality of your next print.



FOLLOW THESE STEPS:

STEP 14: Clean the stencil, screen and frame, and squeegee with warm water.



STEP 15: When you complete Objective 6, return all clean tools and materials to their proper storage areas and clean your work area.

If you finish Day 5 Activities with time left over, you may begin with Day 6 Activities. To complete Day 6 Activities, you will need to provide a 100% cotton T-shirt or sweatshirt. You should wash your T-shirt or sweatshirt at home before bringing it to school, so that it is ready for screen printing.

TECHNOLOGY EDUCATION THERMAL SCREEN PRINTING

On Day 6 you should complete the following activities:

❶ Complete Objective 7

DAY 6 ACTIVITIES

SUMMARY OF ACTIVITIES

Creative Thinking/Problem Solving Skills:

- Transfer training to new situations.
- Evaluate results.
- Create a finished product.

DAY 6 ACTIVITIES

INTRODUCTION

For screen printing fabrics, the stencil must be clean and mounted on the frame. The frame is then placed over the object that will be printed.

Spreading ink across the screen and forcing the ink through the holes of the stencil will print your design on the object below. Remember to be sure that you use water-based textile ink for printing your T-shirt design. This type of ink works well for printing on cotton. It is also easy to clean up and wash out with water until it dries.

After the ink dries, it must be heat set. Heat setting means to apply heat to the print so that the fabric will absorb the ink better. There are large heat presses that can be used, but simply iron the print also works well for screen-printed designs.

Your T-shirt or sweatshirt must be 100% cotton to use the water-based textile ink provided for your printing process. You need to wash your shirt before printing to help the ink adhere to the fabric better.

You will use the same steps for printing your T-shirt that you used for printing your poster, as well as a couple of new steps.

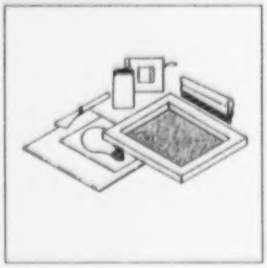
TECHNOLOGY EDUCATION THERMAL SCREEN PRINTING

DAY 6 ACTIVITIES

OBJECTIVE 7

Use your screen and stencil to print your design on a T-shirt.

TOOLS AND MATERIALS



- Stencil of your print design
- Screen and plastic frame
- Masking tape
- One jar of water-based textile printing ink for fabrics
- Pallet knife
- One squeegee
- One 100% cotton T-shirt or sweatshirt (washed)

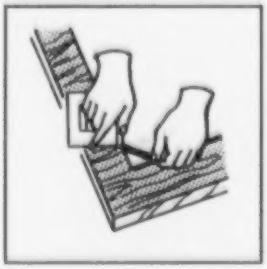
TECHNOLOGY EDUCATION THERMAL SCREEN PRINTING

DAY 6 ACTIVITIES

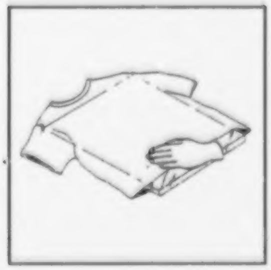
PROCEDURES

FOLLOW THESE STEPS:

STEP 1: Place a sheet of paper across the wooden mounting board to absorb the ink. The paper will keep the wooden frame from being stained.

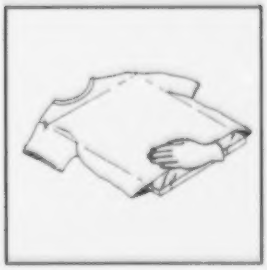


STEP 2: Center your T-shirt over the paper and stretch it across the wooden mounting board.



NOTICE

If there are any wrinkles on the T-shirt, it will affect the quality of your print. Be sure to center your T-shirt.



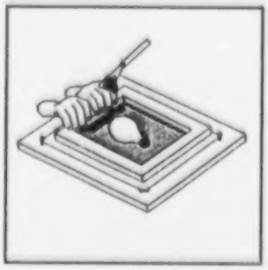
FOLLOW THESE STEPS:

STEP 3: Make sure the T-shirt is centered, wrinkle-free, and stretched tight.

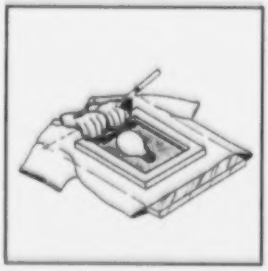
IMPORTANT

Steps 4 through 10 are the same as you followed for printing your posters, so these steps should be familiar.

STEP 4: Tape your stencil to the screen and plastic frame, using masking tape. Make sure that the shiny side of the stencil is down and facing the screen.



STEP 5: Place the frame with the mounted stencil over your T-shirt, centering the screen on the T-shirt.



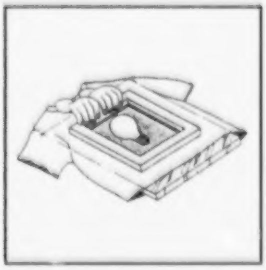
TECHNOLOGY EDUCATION THERMAL SCREEN PRINTING

DAY 6 ACTIVITIES

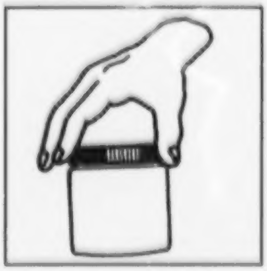
FOLLOW THESE STEPS:

NOTICE

If the frame moves while you are printing, the quality of your print will be affected. Unless you are using the four-color press machine, you have no way to mount your stencil and screen to the T-shirt or sweatshirt. Get assistance with holding the frame securely during the inking process, Steps 6 through 10.

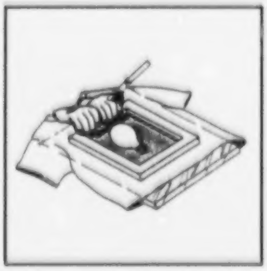


STEP 6: Open your jar of printing ink. Be sure that you are using water-based textile ink for printing fabrics.



NOTICE

DO NOT spread ink within ½" along the edges of the stencil, so that the ink doesn't bleed over onto the print.

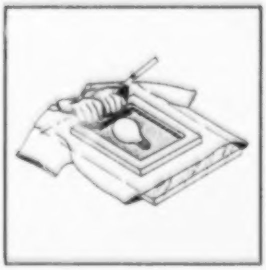


TECHNOLOGY EDUCATION THERMAL SCREEN PRINTING

DAY 6 ACTIVITIES

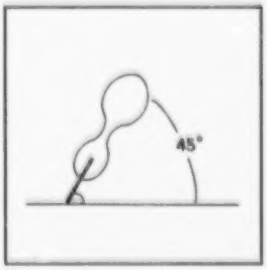
FOLLOW THESE STEPS:

STEP 7: With someone else holding the frame securely, use the pallet knife to spread ink across the top of the screen. Remember to leave a ½" border.

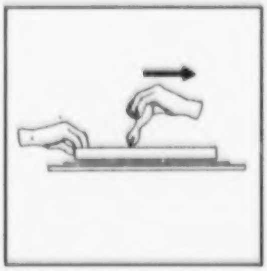


Steps 8 through 10 will allow you to print your design on your T-shirt.

STEP 8: Hold the squeegee firmly with both hands at a 45° angle to the screen.



STEP 9: Pull the squeegee across the stencil to spread the ink.

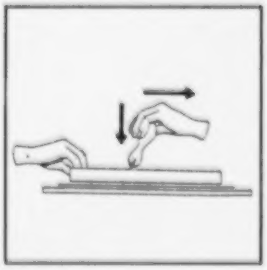


TECHNOLOGY EDUCATION THERMAL SCREEN PRINTING

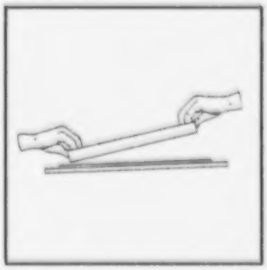
DAY 6 ACTIVITIES

FOLLOW THESE STEPS:

STEP 10: Apply pressure with your hands to control the amount of ink that passes through the stencil and onto the T-shirt.



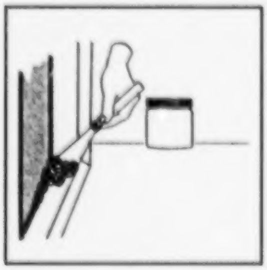
STEP 11: Carefully lift the frame from the T-shirt.



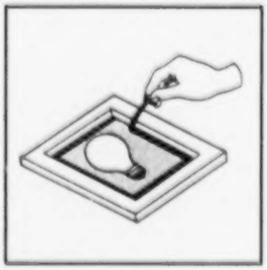
STEP 12: Allow the ink on your T- shirt to air dry overnight.

FOLLOW THESE STEPS:

STEP 13: Scrape any leftover ink from the screen and stencil back into the jar with the pallet knife, and replace the lid.

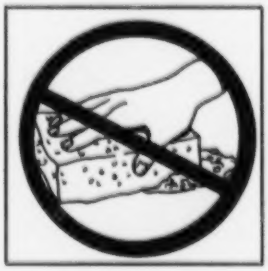


STEP 14: Untape the stencil from the screen and frame.



NOTICE

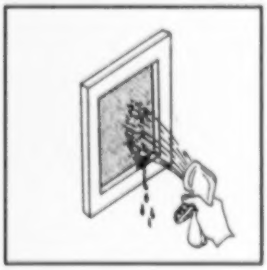
Carefully rinse and wipe your stencil. DO NOT scrub your stencil, or you may damage the emulsion and affect the quality of your print.



DAY 6 ACTIVITIES

FOLLOW THESE STEPS:

STEP 15: Clean the stencil, screen and frame, and squeegee with warm water.



STEP 16: When you complete Objective 6, return all clean tools and materials to their proper storage area and clean your work area.

If you finish Day 6 Activities with time left over, you may begin Day 7 Activities.

TECHNOLOGY EDUCATION THERMAL SCREEN PRINTING

DAY 7 ACTIVITIES

On Day 7 you should complete the following activities:

❶ Complete Objective 8

SUMMARY OF ACTIVITIES

Creative Thinking/Problem Solving Skills:
- Transfer training to new situations.
- Evaluate results.
- Create a finished product.

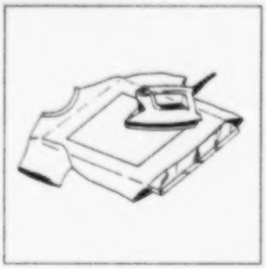
TECHNOLOGY EDUCATION THERMAL SCREEN PRINTING

DAY 7 ACTIVITIES

OBJECTIVE 8

Heat-set the ink of your printed design after the ink has dried overnight.

TOOLS AND MATERIALS



- ➢ Iron
- ➢ Your printed T-shirt or sweatshirt
- ➢ One sheet of paper (8 1/2 X 11 inches)

PROCEDURES

FOLLOW THESE STEPS:

CAUTION

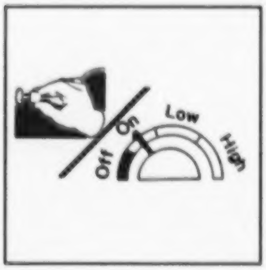
HOT IRON can burn skin. Use heated iron with extreme caution. You may need to seek your instructor's assistance for Steps 1 through 5.

TECHNOLOGY EDUCATION THERMAL SCREEN PRINTING

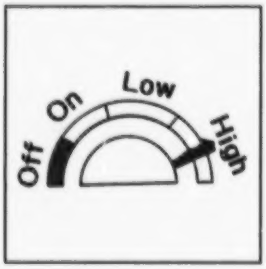
DAY 7 ACTIVITIES

FOLLOW THESE STEPS:

STEP 1: Plug in and turn on the iron.



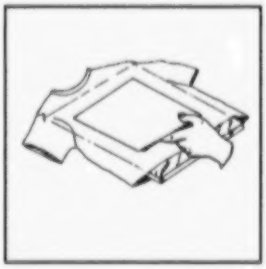
STEP 2: Set the iron to its highest setting.



NOTICE

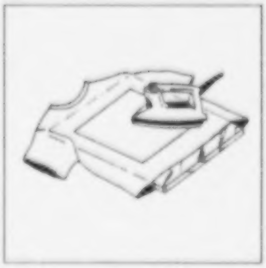
HOT IRON can scorch material and pick up ink. Paper will protect the print from scorching and keep the iron clean.

STEP 3: Place a clean sheet of paper over the print design on your T-shirt.



FOLLOW THESE STEPS:

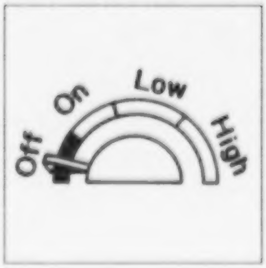
STEP 4: With the hot iron, iron over the print for 30-45 seconds with the paper placed between the iron and the T-shirt. The ink should get duller and darker. For example, red will become dark red.



CAUTION

HOT IRON can burn skin. Iron will still be HOT for several minutes after turning it OFF. DO NOT touch the iron's surface.

STEP 5: Turn the iron off, and unplug it.

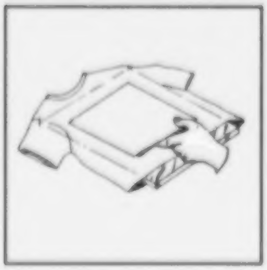


TECHNOLOGY EDUCATION THERMAL SCREEN PRINTING

DAY 7 ACTIVITIES

FOLLOW THESE STEPS:

STEP 6: Carefully remove the paper from the print on your T- shirt.



STEP 7: Examine the print on your T-shirt.

STEP 8: When you complete Objective 7, return tools and materials to their proper storage area and clean your work area.

If you finish Day 7 Activities with time left over, you may begin Day 8 Activities.

TECHNOLOGY EDUCATION THERMAL SCREEN PRINTING

On Day 8 you should complete the following activities:

❶ Read Impact Statements.

❷ Complete Career Search Activity.

❸ Complete any unfinished assignments.

❹ Complete Posttest.

❺ Turn in all assignments for the TLA.

DAY 8 ACTIVITIES

SUMMARY OF ACTIVITIES

Reading Comprehension Skills:
- Gain factual information.

Functional Reading Skills:
- Follow written instructions.
- Use content area vocabulary.

ENVIRONMENTAL IMPACT

Silkscreening or the screen printing process affects the environment in many ways. For example, people using this process should carefully choose the materials and inks they use for the environmental impact they have.

Not all materials used for printing are biodegradable or recyclable.

- Materials that are not biodegradable can take many years to decompose (break down and disappear) when thrown out. For example, rubber, vinyl, and many plastics are not biodegradable.
- Objects that are not recyclable have no value after they are used once. They are often slow to decompose. These types of materials are hard to dispose of safely and can accumulate and harm our environment.

However, some materials like wood, glass, aluminum, and some plastics can be recycled. Then these materials can be used for new objects. Recycling can save trees and help make better use of natural resources, like land, trees, and water.

The type of ink used for printing can also affect the environment. Some inks may contain pollutants that are dangerous to the earth and inhabitants when thrown away and left to decompose. Some are harmful to the air if burned. Some are harmful to the water, the fish living in the water, and the animals that drink the water in polluted lakes or rivers.

Screen printing affects society in many ways. People want to express opinions by wearing, buying, or displaying objects printed with drawings and words that express things they feel and believe. With printed designs, people can express opinions or show that they belong to a certain group.

Almost all cultures use screen printed designs on objects. These designs can show membership, opinions, or can be used as a way of attracting people's attention. People respond to things they see. Printed designs can contain messages that all people of the same culture will understand, or that only some people in certain groups or with certain talents will understand. Printed designs can be positive or negative. Some designs are used to get people to buy products or join groups.

SOCIAL/ CULTURAL IMPACT

TECHNOLOGY EDUCATION THERMAL SCREEN PRINTING

DAY 8 ACTIVITIES

ECONOMIC IMPACT

Most countries use visually attractive packages and wrappers to help sell products. Packaging can often affect what people will buy. Screen printing items with attractive designs can help some items sell better. Items that can be screen printed include the following:

- mirrors and windows
- drinking glasses and cans
- calendars and greeting cards
- clothing (like T-shirts, jackets, leather, and even furs)
- wooden crates and other containers

Manufacturers can often produce large quantities of printed items for very little extra cost. Advertisers can use screen printed items to appeal to people's interest in certain issues.

POLITICAL IMPACT

Federal and State laws regulate waste disposal. They can require that certain materials not be used or that they be disposed of in certain ways. Many states forbid burning paints and inks and dumping them in water or on land. All of these laws and regulations must be taken into account when designing products and when screen printing.

ERGONOMIC IMPACT

Ergonomics means developing products and systems that are comfortable for people to use and that fit their needs. For example, screen printers should design and print images that people like and will want to display.

Screen printers must carefully choose the materials they use. Materials need to be of good quality to please people. The objective is to provide a product, for example a T-shirt, that is comfortable, appealing, and durable.

TECHNOLOGY EDUCATION THERMAL SCREEN PRINTING

DAY 8 ACTIVITIES

CAREER SEARCH ACTIVITY

INSTRUCTIONS

Using the Career Search Abstracts, find the occupations listed below. Select the two occupations that sound most appealing to you. On a separate sheet of notebook paper, list the two occupations you selected, and tell why. Remember to write using complete sentences, proper grammar, and correct spelling. Give the sheets to your instructor.

RELATED CAREERS

- Commercial Artist
- Designer
- Public Relations Specialist
- Sign Painter
- Visual Artist

THERMAL SCREEN PRINTING CAREER SEARCH ABSTRACTS

DAY 8 ACTIVITIES

COMMERCIAL ARTIST

Nature of the Occupation

Commercial or graphic artists apply their skills and artistic vision to a variety of media to produce art that serves a client's needs. They create artwork to illustrate or promote products, services, and ideas, as well as artwork used primarily to improve appearance or attract attention. They plan, design, and draw illustrations for various media, such as billboards, brochures, catalogs, books, magazines, newspapers, television, and packaging.

Duties may include but are not limited to the following:

- Confer with clients to plan design and determine budget, presentation approaches, and styles
- Assign and direct staff members to develop design concepts
- Examine designs, sketches, or illustrations
- Determine nature, size, and arrangement of materials
- Select best techniques to produce desired effect
- Produce samples for client approval
- Direct and instruct photographers or illustrators in execution of design concepts
- Inspect and review final production and suggest any needed improvements
- Present production to clients for approval

Occupation Specialties

(Dot codes in parenthesis)

Art Directors (141.031-010) formulate concepts and supervise workers engaged in executing layout designs for artwork and copy to be presented by such visual communication media as magazines, books, newspapers, television, posters, and packaging.

Cartoonists (141.061-010) draw comic or editorial cartoon and comic strips to amuse readers and illustrate or comment upon news events, advertising, stories, or articles.

Graphic Designers (141.061-018) design art and copy layouts for material to be presented by such visual communication media as books, magazines, newspapers, television, packaging, and advertising.

Illustrators (141.061-022) draw or paint illustrations for use by various media to explain or adorn the printed or spoken word.

Medical and Scientific Illustrators (141.061-026) make sketches and construct 3-dimensional models to illustrate surgical and medical research procedures, anatomical and pathological specimens, clinical disorders, micro-organisms, and plant and animal tissue.

Working Conditions

Commercial artists may work alone or in a team with the art director giving general supervision. Many illustrators are freelance artists who service regular accounts along with new or one-time customers.

Working conditions may vary by the type of artwork and the employer. Generally, commercial artists work in clean, well-lighted, temperature-controlled areas in office buildings, department stores, art studios, advertising agencies, or printing or industrial plants. Medical and scientific illustrators frequently spend time in operating rooms observing and sketching surgical procedures or in laboratories containing specimens and equipment that they use to prepare drawings. Commercial artists may spend much of their time standing or sitting at a drawing board or work table.

Salaried commercial artists usually work 35 to 40 hours a week. Employers generally provide all supplies and equipment. Commercial artists may be required to work irregular hours or overtime during emergencies and to meet deadlines. However, many jobs in this field can lead to free-lancing or to flexible hours.

Worker Requirements

You should like:

- Activities concerned with communicating ideas to people
- Activities which require creative imagination
- Activities bringing satisfaction from seeing your work in print

You should be able to:

- Reason logically and create new ideas
- Understand the meaning of words and use language effectively
- Make decisions based on personal judgment
- Interpret feelings, ideas, or facts artistically
- Accept criticism of your work
- Influence people's opinions, attitudes, or judgments
- Understand the 2-dimensional representation of objects

OCCUPATION SPECIALTIES

DOT CODES:

141.031-010	Art Director
141.061-010	Cartoonist
141.061-018	Graphic Designer
141.061-022	Illustrator
141.061-026	Medical And Scientific Illustrator

SOC CODE: 322, 325

OKLAHOMA CAREER SEARCH

COMMERCIAL ARTIST

- Perceive details in objects or drawings and see differences in their shapes or shadings
- Coordinate and plan entire activities, if an art director
- Move your fingers and handle small objects accurately

Physically you must:
- Use your hands and fingers fully
- Coordinate the movements of eyes and hands or fingers
- See well, naturally or with correction, and distinguish colors
- Talk and hear, if an art director or a graphic designer

Special Requirements:
Most employers prefer 4-year art school graduates with technical and commercial skills. Graphic arts applicants should demonstrate talent, training, and experience. Artists in scientific and medical illustration need specialized training.

Opportunities for Experience:
Related postsecondary programs may offer experience. Consider working on the school yearbook, newspaper, stage sets, bulletin boards, or posters as experience. For more experience, create posters, layouts, or illustrations for church and community groups. Part-time or summer jobs in commercial art studios or military service may help.

Earnings and Advancement

Commercial artists' earnings depend on skill, education, type of artwork, geographic area, and type and size of employer. Earnings of a free-lance commercial artist may vary with the artist's individual fees and reputation, as well as the nature and amount of artwork sold.

Earnings:
Nationally, in 1991, fine artists and commercial artists who usually worked full time earned median salaries of about $22,419 per year. The middle 50 percent earned between $17,118 and $31,952 per year. The top 10 percent earned more than $42,223. The bottom 10 percent earned less than $19,941 per year.

Inexperienced illustrators employed by the Federal Government started at the GS-5 level with annual earnings in 1991 of $16,305. They may advance to the GS-12 level with a salary of $35,825.

Career Ladder for this Occupation may look like this:
- Art Director
- Illustrator
- Trainee

Beginning commercial artists usually need on-the-job training and are assigned routine work. Advancement depends on individual talent, creativity, and education. Experienced commercial artists may eventually become art directors, if they have managerial ability, or open their own studios.

Employment and Outlook

Nationally, there were approximately 216,000 fine artists and commercial artists employed in 1988. Employment is expected to grow faster than the average for all occupations through 2000 as the areas of advertising and design continue to expand with the economy. Commercial artists with average ability and little specialized training are expected to encounter keen competition for beginning jobs and have limited advancement opportunities.

The demand for commercial artists may vary according to specialization or type. The demand for free-lance artists is expected to increase, while jobs for art directors and graphic designers will be fewer and open only to experienced, highly talented, and creative artists. One area of growth is in visual advertising such as television graphics, packaging displays, and poster and window displays. Another is industrial design which is expected to require more qualified artists to do 3-dimensional work with engineering concepts.

Commercial artists held about 1,125 jobs in Oklahoma during 1986. That number is expected to increase to 1,173 by 1992 which represents a 4.44 percent change. Job openings each year for commercial artists will equal approximately 38, with 30 of those due to replacements and 8 created through new jobs.

Related Education and Training

Level(s) of education and training usually needed for this occupation:
- On-the-job training
- Technical junior or community college
- College bachelor's degree

School subjects helpful in preparing for this occupation include:
- College Preparatory
- Crafts
- Custodial Service
- Arts
- Photography
- Graphic Arts

More Sources of Information

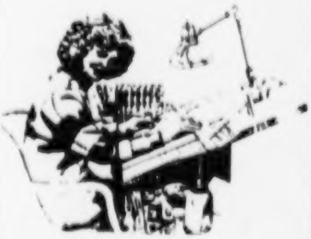
- National Association of Schools of Art and Design
  11250 Roger Bacon Dr., #5
  Reston, VA 22090

- The Society of Illustrators
  128 East 63rd Street
  New York, NY 10021

- Association of Medical Illustrators
  1819 Peachtree St., NE
  Suite 560
- Atlanta, GA 30309

- The Graphic Artists Guild
  11 West 20th Street
  New York, NY 10011

DESIGNER



Nature of the Occupation

Designers arrange and design articles, products and materials in such a way that they not only serve the purpose for which they were intended but are visually pleasing as well.

Duties may include but are not limited to the following:

- Conferring with clients to determine factors which affect planning
- Formulating a plan to serve an intended purpose
- Rendering design ideas in the form of paste-ups, drawings, or illustrations and presenting them to clients
- Estimating material requirements and costs and confirming these with suppliers
- Selecting, designing, and purchasing furnishings, art works, and accessories
- Developing business contacts and performing administrative tasks such as checking catalogues and ordering samples.
- Writing specifications such as colors and types of material to be used
- Conferring with and coordinating activities of workers who construct patterns and sample garments
- Showing new styles to salespersons at style shows and sales meetings
- Making frequent trips to garment centers and fashion shows to keep in touch with new styles

Occupation Specialties

(Dot codes in parenthesis)

Interior Designers (142.051-014) plan and furnish the interiors of homes, public buildings and commercial establishments.

Fashion Designers (142.061-018) design coats, suits, dresses, hats, handbags, shoes, gloves, jewelry, and underwear. They design original garments as well as follow the established fashion trends.

Package Designers (142.081-018) create product containers that are not only attractive but easy to handle and store.

Textile Designers (142.061-014) design fabrics for garments, upholstery, rugs, and other products.

Floral Designers (142.081-010) cut and arrange fresh, dried or artificial flowers and foliage into design to express the sentiments of the sender.

Industrial Designers (142.061-026) develop countless manufactured products like cars, home appliances, computers, cabinets and pens.

Working Conditions

Designers work alone but coordinate their efforts with many other people.

Interior designers may work in their homes, subcontractors' offices, and establishments that sell the various materials they work with. Interior designers, hours are often long and irregular. They usually adjust their workday to suit their clients, meeting with them evenings or on weekends when necessary.

Self-employed designers work long hours and are involved with a lot of paperwork in taking care of their business.

Clothes designers usually work in an area that contains all the equipment and materials needed for the creation and fashioning of clothing. They usually work regular hours; however, their work may be seasonal and require long hours before fashion showings.

Industrial designers usually work regular hours but occasionally work overtime to meet deadlines.

Floral designers usually work regular hours in a pleasant work environment.

Tools, Equipment and Materials used may include:

- Blueprints
- Fibers
- Sketch Pads
- Drawing Instruments
- Rulers
- Fabrics
- Cutting Tables
- Plastics
- Ceramics
- Textiles
- Woods
- Scissors
- Dress Forms (Mannequins)

Worker Requirements

You should like:

- Activities providing the opportunity for artistic self-expression
- Activities involving business contact with people

You should be able to:

- Demonstrate artistic talent, imagination, and creative drawing and ability
- Perceive detail

OCCUPATION SPECIALTIES

DOT CODE:

142.051-014	Interior Designer
142.061-018	Fashion Designer
142.061-026	Industrial Designer
142.081-018	Package Designer
142.061-014	Textile Designer
142.081-010	Floral Designer

SOC CODE: 322

OKLAHOMA
CAREER
SEARCH

DESIGNER

- Visualize three-dimensional objects from diagrams
- Influence others in their judgments about ideas and things
- Plan, organize and carry out projects to completion

Physically you must:
- Have good vision, depth perception and color vision
- Have full use of your hands and fingers

Special Requirements:
Employers usually require training covering all phases of interior and clothing design. Formal training is becoming increasingly important.

Opportunities for Experience:
Opportunities for experience and exploration in clothes designing include summer and part-time work in department stores, fabric firms, or costume rental houses. Work with amateur theater wardrobes and dressmaking are also good experience for this occupation. Interior designers may serve an informal apprenticeship in a design studio.

Opportunities for experience in floral design include summer and part-time work in a florist shop.

Methods of Entry:
Graduates of training programs in design may find employment through school placement offices, direct application to employers, or submitting a resume to a professional association of design.

Earnings and Advancement

Designers and assistant designers may be paid straight salaries, salaries plus commissions or bonuses, or straight commissions. Income is affected by volume of business, professional prestige, economic level of clients, and business competence.

Earnings:
Median annual earnings for experienced full-time designers were about $28,700 in 1990. The middle 50 percent earned between $18,100 and $38,000 a year, while the lowest 10 percent earned less than $12,300, and the highest 10 percent earned more than $51,100. Floral designers generally earn less than this with a range from about $10,000 for beginners to as much as $18,100 for managers with experience.

Earnings of self-employed designers vary widely but are generally higher than those of salaried designers.

Fringe Benefits:
Fringe benefits for designers may include commissions, profit sharing and bonuses. For those employed by a firm, benefits may include paid holidays and vacations; health, life, and accident insurance; retirement plans, and sick leave. These benefits are usually paid for, at least in part, by the employer.

Career Ladder for this Occupation may look like this:
- Self-employed
- Design Department Head
- Designer
- Junior Designer

Employment and Outlook

Nationally, there were approximately 309,000 designers employed in 1988. In response to factors such as product quality and safety, new and high-tech products for businesses, offices, medicine, and transportation, demand for industrial designers should increase. Growth in population and personal incomes should spur demand for interior, fashion, floral, and set designers. However, because many people are attracted to the field, stiff competition is expected, except in floral design.

Designers held about 135 jobs in Oklahoma during 1986. That number is expected to increase to 139 by 1992, which represents a 3.70 percent change. Job openings each year for designers will equal approximately 4, with 3 of those due to replacements and 1 created through new jobs.

Related Education and Training

Level(s) of education and training usually needed for this occupation:
- College bachelor's degree

Level(s) of education and training also available for this occupation:
- On-the-job training
- Technical junior or community college
- College master's degree

School subjects helpful in preparing for this occupation include:
- Arts
- Clothing & Textiles
- Interior Design
- Graphic Arts
- Crafts
- Cooperative Education - Home Economics
- General Merchandising

More Sources of Information

- International Society of Interior Designers
  433 Spring Street, Suite 1014
  Los Angeles, CA 90013

- American Society of Interior Designers
  1430 Broadway
  New York, NY 10018

- Amalgamated Clothing and Textile Workers Union
  15 Union Square
  New York, NY 10003

PUBLIC RELATIONS SPECIALIST

Nature of the Occupation

Public relation specialists plan and conduct public relations programs to promote products, ideas, companies, or people. They influence opinions through promotional techniques and two-way communications.

Duties may include but are not limited to the following:
- Determining the needs of the company or individual
- Preparing and distributing fact sheets, photographs, articles, news releases, and/or promotional booklets
- Making speeches, conducting research
- Directing advertising campaigns in all types of media
- Coordinating special exhibits, contests, or luncheons into the total public relations plan

Occupation Specialties

(Dot codes in parenthesis)

Sales-Service Promoters (165.167-010) generate sales and create good will for a firm's products by preparing displays and touring the country. They call on merchants to advise them of ways to increase sales and demonstrate products.

Working Conditions

Public relations specialists may work alone or with a team on a particular project. The work is often done in comfortable, well-lighted, and ventilated offices. Public relations specialists usually work 35 to 40 hours a week, 5 days a week. A public relations specialist's routine consists of preparing and delivering speeches, attending meetings and community activities, and out-of-town travel.

Many times overtime is required and sometimes specialists are on call around the clock.

Public relations specialists may belong to the Public Relations Society of America. Members pay periodic dues.

Tools, Equipment and Materials used may include:
- Typewriters
- Cameras
- Telephones
- Audio-Visual Equipment
- Surveys & Reports
- Showcases
- Charts
- Interview Forms
- Account Records

Worker Requirements

You should like:
- Communicating with people
- Abstract and creative work

You should be able to:
- Influence and react to people's ideas and attitudes
- Project self-confidence, speak clearly
- Communicate ideas and information verbally and in writing
- Evaluate information and make quick judgments and decisions
- Plan, control, and complete projects from start to finish
- Deal with people in all situations

Physically you must:
- Lift and carry light materials
- See and hear well, either naturally or with correction

Opportunities for Experience:

Summer work at radio and television stations, at newspaper offices, and volunteer work with charitable and community organizations can provide experience in this field.

Methods of Entry:

One method is to apply directly to civil service offices, advertising agencies, newspapers, radio and television stations, businesses, or industries. Assistance may also be obtained from college placement offices and newspaper want ads.

Earnings and Advancement

Earnings vary by the type of business, location, and size of employer. Private consulting firms generally pay more than companies that have their own

OCCUPATION SPECIALTIES
DOT CODE:
165.067-010 Public Relations Representative
165.167-010 Sales-Service Promoter
SOC CODE: 332

OKLAHOMA
CAREER
SEARCH

PUBLIC RELATIONS SPECIALIST

public relations departments. Those who work in public relations firms often receive substantial salary increases based on successful performance.

Earnings:

Nationally, in 1990, the average annual earning for public relations specialists was $28,370. The middle 50 percent earned between $20,870 and $44,450 a year. The top 10 percent of public relations practitioners in all organizations earned an average salary of more than $56,000, and the lowest 10 percent earned less than $15,900.

Public relations specialists graduating with a bachelor's degree and employed by the Federal Government earned a starting salary of $20,195 in 1990.

Those graduating with a master's degree earned a starting salary of $24,705. Public relations specialists employed by the Federal Government earned an average salary of $39,450 in 1990.

Fringe Benefits:

Public relations specialists may receive an expense account; hospital and life insurance; sick leave; paid vacations and holidays; and retirement plans. These benefits are usually paid for, at least in part, by the employer.

Career Ladder for this Occupation may look like this:
- Own Business
- Supervisor
- Public Relations Specialist
- Public Relations Trainee

A successful career depends on individual ability, initiative, self-confidence, desire, capacity for hard work, and experience.

Employment and Outlook

Nationally, in 1988, there were approximately 91,000 public relations specialists employed. Employment is expected to grow much faster than the average for all occupations as corporations, associations, medical centers, and other large organizations expand their public relations efforts. There will be keen competition for beginning jobs since the diversified nature of the occupation attracts many applicants. Prospects for a career in public relations are best for highly-qualified applicants--talented people with sound academic preparation and some media experience.

Public relations specialists held about 1,530 jobs in Oklahoma during 1986. That number is expected to increase to 1,701 by 1992, which represents a 11.11 percent change. Job openings each year for public relations specialists will equal approximately 115, with 86 of those due to replacements and 29 created through new jobs.

Related Education and Training

Level(s) of education and training usually needed for this occupation:
- Technical junior or community college
- College bachelor's degree

School subjects helpful in preparing for this occupation include:
- College Preparatory
- English
- Speech
- Humanities
- Sociology
- Composition
- Journalism
- Typing
- Psychology

More Sources of Information

- Women Executives in Public Relations
  P. O. Box 781
  Murray Hill Station
  New York, NY 10156
- American Association of Advertising Agencies
  666 Third Avenue
  13th Floor
  New York, NY 10017
- International Public Relations Association, U.S. Section
  250 W. Floresta Way
  Menlo Park, CA 94025
- College Placement Offices
- Local, State, and Federal Civil Service Offices

THERMAL SCREEN PRINTING CAREER SEARCH ABSTRACTS

DAY 8 ACTIVITIES

SIGN PAINTER AND LETTERER

Nature of the Occupation

Sign painters design, lay out, and paint letters and graphics to make signs that illustrate advertisers' products and sales messages.

Duties may include but are not limited to the following:

- Determining customers' needs and design specifications
- Drawing outlines directly on the surface to be painted or preparing paper patterns or stencils to use for sign layout
- Determining which paints are best suited for use on different materials
- Matching colors and mixing paint
- Painting the sign
- Using gold or silver leaf to form signs on doors or windows

Occupation Specialties

(Dot codes in parenthesis)

Lay-out Formers (970.381-018) prepare the layout of advertising materials by trimming photographs, drawings, or sketches to the proper size; indicating their position on the layout; and drawing a straight or decorative border in crayon, ink, pencil, or paint. They also position hand-lettered copy on the layout.

Hand Sign Writers (970.281-022) print, paint, or write signs used for displays or other purposes. They may also cut out letters and signs from wallboard or cardboard.

Letterers (970.661-014) paint or draw precise lettering to be reproduced in advertisements, books, and other printed materials, using lettering pen or brush.

Working Conditions

Sign painters may work alone or as members of a crew under the direction or supervision of a more experienced worker or project supervisor. They may work in well-lighted and ventilated sign shops or outdoors at display sites. Painters usually work outdoors year round and are subject to all weather conditions. Sign painters are subject to falls from ladders, scaffolds, and painting platforms and inhalation of fumes from paint and other materials.

Sign painters generally work a 40-hour week during normal business hours. Overtime may be required on occasion to complete a project or meet a deadline.

Most of the supplies sign painters need are furnished by employers, although sign painters may be expected to have their own small brushes, lettering quills, and layout instruments. A good kit may cost more than $225.

Sign painters may join unions or associations such as the Graphic Communications International Union. Members usually pay dues.

Tools, Equipment and Materials used may include:

- Jigsaws & Bandsaws
- Drafter's Instruments
- Chalk
- Shading Pencils
- Knives
- Angles, Rulers & T-Squares
- Acrylic Coatings
- Blueprints
- Perforating Tools
- Paints
- Lacquers
- Shellac
- Brushes
- Asbestos
- Plastic
- Silk

OCCUPATION SPECIALTIES

DOT CODE:

970.381-026	Painter, Sign
970.381-018	Lay-Out Former
970.281-022	Sign Writer, Hand
970.661-014	Letterer

SOC CODE: 6863

OKLAHOMA CAREER SEARCH

SIGN PAINTER AND LETTERER

Worker Requirements

You should like:

- Working with things and objects in an abstract and creative way
- Performing activities which involve the use of machines, processes, or methods
- Performing activities which bring personal satisfaction from working on or producing things

You should be able to:

- Rate information using measurable standards
- Work within precise limits or standards of accuracy
- Have a feeling for form, color, and composition
- Perceive pertinent detail in objects or in pictorial or graphic material
- Understand the relationships of plane and solid objects

Physically you must:

- Climb on ladders, scaffolds, or platforms and maintain your balance
- Stoop, crouch, kneel, or crawl
- Use your hands easily and skillfully and manipulate small objects with your fingers
- See well, either naturally or with correction, including color vision

Methods of Entry:

Methods of entering this occupation include applying directly to employers and completing an apprenticeship program. Positions may also be located by consulting newspaper ads, trade journals, school placement centers, local sign painter unions, and state employment offices.

Earnings and Advancement

Earnings depend upon the employer, geographic location, union affiliation, and individual experience.

Earnings:

Nationally, letterers earned approximately $606 per week or $31,512 per year in 1990. Apprentice letterers earned starting salaries which averaged only half that of experienced letterers. The Federal Government paid letterers an average salary of $25,602 per year.

Fringe Benefits:

Depending on the employer, sign painters may receive vacation and holiday pay; life; accident, disability, and hospitalization insurance; retirement plans; and sick pay. These benefits are usually paid for, at least in part, by the employer. In some cases, employers and employees may jointly contribute to union funds used to pay for certain benefits.

Career Ladder for this Occupation may look like this:

- Own Business
- Sign Painter
- Assistant

Sign painters may advance through additional experience and by training through additional education. Sign painters may become commercial artists.

Employment and Outlook

It is estimated that employment of sign painters and letterers will grow more slowly than the average for all occupations through the year 2000.

Related Education and Training

Level(s) of education and training usually needed for this occupation:

- On-the-job training
- High school diploma with vocational education

Level(s) of education and training also available for this occupation:

- Less than a high school diploma
- Technical junior or community college

School subjects helpful in preparing for this occupation include:

- Art
- Drafting
- General Math
- Graphic Arts

More Sources of Information

- Graphic Communications International Union
  1900 L Street, NW
  Washington, DC 20036
- Graphic Arts Technical Foundation
  4615 Forbes Avenue
  Pittsburgh, PA 15213
- State Employment Offices
- High School or Community College Placement Offices

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VISUAL ARTIST

Nature of the Occupation

Visual artists create abstract works or realistic images of objects, people, nature, places, and events, with a wide variety of methods and materials, to communicate ideas, thoughts, and feelings. They may use oils, watercolors, acrylics, pastels, chalk, charcoal, pencils, pen and ink, silkscreen, clay, plaster, or other media, including computers, to create works of art.

Duties may include but are not limited to the following:

FINE ARTISTS
- Expressing feelings in art
- Specializing in one or two media
- Selling works to stores, galleries, museums, or collectors

GRAPHIC ARTISTS
- Serving clients' needs with art in advertising, design, packaging, illustration, or cartoons

Occupation Specialties

(Dot codes in parenthesis)

Cartoonists (141.061-010) draw political cartoons, newspaper comics, or comic books.

Fashion Artists (141.061-014) draw stylish illustrations of new clothing fashions.

Illustrators (141.061-022) create pictures for books, magazines, billboards, posters, and record albums.

Medical and Scientific Illustrators (141.061-026) draw precise illustrations of machines, plants, animals, or parts of the human body for business and educational purposes.

Set Illustrators (141.061-030) build and decorate sets for movies, television, and theatrical productions.

Motion Picture Cartoonists (141.081-010) draw series of pictures for animated films shown on TV and in movies.

Working Conditions

Graphic and fine artists generally work in art studios, at home, or in offices. Graphic artists work 40-hour weeks but often work overtime to meet frequent deadlines. Many graphic artists also freelance for occasional clients. Independent visual artists also spend considerable time and effort recruiting potential clients. Some fine artists spend time out of doors in search of subjects.

Tools, Equipment and Materials used may include:
- Airbrushes
- Acid
- Oil Paints
- Watercolors
- Acrylics
- Clay
- Plaster
- Brushes & Matte Knives
- Canvas & Gesso
- Pen & Ink
- Wood
- Stone
- Plastic
- Sponges & Rags
- Models & Still-Life Arrangements
- Power & Hand Chisels
- Computers
- Knives
- Chalk
- Charcoal
- Pastels
- Varnish
- Turpentine & Paint Thinner
- Pencils
- Paper, Cardboard & Board
- Armatures
- Concrete
- Metal
- Wire

Worker Requirements

You should like:
- Expressing emotions
- Working alone and with others
- Translating ideas into visual form
- Satisfying others' expectations

You should be able to:
- Analyze and visualize an artistic task into details
- Communicate well with clients and co-workers

OCCUPATION SPECIALTIES

DOT CODE:

141.061-010	Cartoonist
141.061-014	Fashion Artist
141.061-022	Illustrator
141.061-026	Illustrator, Medical & Scientific
141.061-030	Illustrator, Set
141.081-010	Cartoonist, Motion Picture

SOC CODE: 3250

OKLAHOMA CAREER SEARCH

VISUAL ARTIST

- Use various media
- Work until a project is perfect
- Work against deadlines

Physically you must:
- See well, naturally or with correction
- Have the stamina and health to work late

Special Requirements:

Good preparation for a visual arts career is usually a four-year post-secondary art school program. This training is absolutely essential for scientific and medical illustrators. To demonstrate and exhibit the skills gained, the art works produced in art schools should be collected in a portfolio, including samples of the artist's best work. Before a candidate gains entry into the graphic art field or other art employment, the portfolio will be carefully examined by prospective employers.

Opportunities for Experience:

Many visual artists freelance part-time while in art school, so that they gain both experience and a professional portfolio. Entry level jobs in advertising and publishing require routine mechanical or paste-up work, but gradually artists are given more responsibility if they show promise.

Methods of Entry:

Visual artists apply directly to employers such as retailers, advertising and graphic design agencies, book publishers, newspapers, governments, manufacturers, and the motion picture industry. Positions may also be found through newspaper ads, school placement offices, and state employment offices.

Earnings:

In 1990, salaried visual artists who usually worked full time had median salaries of $21,700 a year. The middle 50% earned between $16,300 and $30,400 a year, while the top 10% earned more than $40,200 and the bottom 10% earned less than $13,000. Because of the nature of this occupation, salaries fluctuate over a wide range.

Self-employed visual artists range from part-timers employed in other work to well established graphic, freelance, and fine artists. Part-timers must often accept low fees, while established artists can demand very high compensation.

Fringe Benefits:

Depending on the employer, visual artists on salary can receive paid vacations and holidays, life, accident, and hospitalization insurance; retirement plans, and sick pay. These benefits are paid for, at least in part, by the employer. Self-employed artists, of course, must arrange for their own ways of meeting these costs.

Career Ladder for this Occupation may look like this:
- Partner/Own Business
- Partner
- Creative Director
- Art Director
- Assistant Art Director
- Mechanical Artists
- Freelancer

Self-employed artists may advance as their work circulates and their reputation spreads. Some freelancers remain freelancers, free to choose the type of work they do. Publishers choose these freelancers for specific kinds of illustrations.

Employment and Outlook

Visual artists held about 216,000 jobs in 1988. The 40 percent who were self-employed were either freelancers or fine artists. The main employers for all visual artists are advertising and commercial art firms, publishers, manufacturers, department stores, the motion picture industry, and government. By far, the most visual artists are concentrated in New York City, followed by Boston, Chicago, Los Angeles, and San Francisco.

Visual art work is expected to grow faster than the average through the year 2000. Emphasis is increasing on visual appeal in packaging, marketing, and other communication. Fine artists may find more demand from corporations as well as affluent individuals. Competition will continue to be keen, but fresh talent is usually rewarded.

Visual artists held about 1,169 jobs in Oklahoma during 1986. That number is expected to increase to 1,221 by 1992, which represents a 4.27 percent change. Job openings each year for visual artists will equal approximately 50, with 41 of those due to replacements and 9 created through new jobs.

Related Education and Training

Level(s) of education and training usually needed for this occupation:
- High school diploma or G.E.D.
- Technical junior or community college

More Sources of Information

- Graphic Artist's Guild
  11 West 20th Street
  New York, NY 10011

- Society of Illustrators
  128 East 63rd Street
  New York, NY 10021

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POSTTEST

INSTRUCTIONS

You will need a computer scan sheet or card to record your answers to the following Posttest. Be sure to write your name, the title of the TLA, the date, and the class period on the computer scan sheet or card using a #2 pencil. Use rows 21-30 to record the answers to the Posttest. If your answers will be hand-scored, use a blank sheet of notebook paper to record your answers, and number your answers 21-30.

SPELLING TEST INSTRUCTIONS

Use rows 31-40 on the test card. If the word is spelled correctly, mark (a) on the computer score sheet or card. If the word is spelled incorrectly, mark (b) on the test card. Be sure to use a #2 pencil and make your marks dark. If your answers will be hand-scored, use a blank sheet of notebook paper to record your answers and number your answers 31-40.

(a) correct (b) incorrect

Get Posttest Questions from your instructor.

If you complete Day 8 Activities with time left over, complete a Skunk Works Activity.

TECHNOLOGY EDUCATION THERMAL SCREEN PRINTING

SKUNK WORKS

BACKGROUND

The term *Skunk Works* comes from an engineering division of the 3M Company. In the late 1960s, a group of engineers at 3M wanted to design a new product, but the managers of the company would not give them the money for research. So they decided to the design the product anyway, then try to convince the company to make it. Whenever the engineers could grab a few extra minutes from their regular assignments, they worked on the new product. In early 1969, they presented it to the marketing division of 3M, and the company has been selling it ever since. The product: Velcro fasteners.

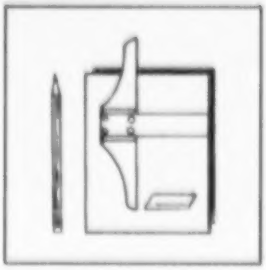
SKUNK WORKS CHALLENGE

Your challenge is the following: You have been hired by an advertising company to develop a company logo, either selling a product or promoting a service. You must design the logo for the company of your choosing on 8½ by 11 inch paper. Think about how the logo would look on T-shirts, hats, company paper, and other places it might be used.

TECHNOLOGY EDUCATION THERMAL SCREEN PRINTING

SKUNK WORKS

TOOLS AND MATERIALS



- Plain white paper (8 1/2 X 11")
- T-square or ruler (optional)
- Pencil with eraser
- Black felt tip-ink pen
- Photocopier